CODE :-

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/*
 * Problem Statement :-
 *      Write a program to demonstrate Sub-netting and find Subnet masks.
*/


#include<bits/stdc++.h>
using namespace std;

int main()
{
    string ip;
    char network_class;
    int subnetworks, borrow_host_bits, host_workable, host_in_each_subnetwork,iprange;
    cout<<"\n\t Enter The IP Address : ";
    cin>>ip;

    int count = 0;
    string gen_ip = "";
    int i = 0;

    while(count!=3)
    {
         if(ip[i]=='.')
         {
             count++;
         }
         gen_ip = gen_ip + ip[i];
         i++;
    }

    count = 0;
    i = 0;
    string small_ip = "";
    while(count!=1)
    {
        if(ip[i]=='.')
        {
            count++;
        }
        small_ip = small_ip + ip[i];
        i++;
    }

    int num = stoi(small_ip);

    if( (num>=1) & (num<=127) )
    {
        cout<<"\n\t IP Address Belongs To Class A \n\n";
        network_class = 'A';
    }
    else if( (num>=128) & (num<=191) )
    {
        cout<<"\n\t IP Address Belongs To class B \n\n";
        network_class = 'B';
    }
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    else if( (num>=192) & (num<=223) )
    {
        cout<<"\n\t IP Address Belongs To class C \n\n";
        network_class = 'C';
    }
    else
    {
        cout<<"\n\t Please Enter Valid IP Address \n\n";
    }

    if(network_class == 'A')
    {
        cout<<"\n\t Default Subnet Mask is 255.0.0.0\n";
    }
    else if(network_class == 'B')
    {
        cout<<"\n\t Default Subnet Mask is 255.255.0.0\n";
    }
    else
    {
        cout<<"\n\t Default Subnet Mask is 255.255.255.0\n\n";
    }

    cout<<"\n\t How Many Subnetworks You Want To Create : ";
    cin>>subnetworks;

    borrow_host_bits = log2(subnetworks);
    if(pow(2,borrow_host_bits) < subnetworks)
    {
        borrow_host_bits+=1;
    }
    cout<<"\n\t Need To Borrow "<<borrow_host_bits<<" host bits \n\n";

    count = borrow_host_bits;
    int cal_subnet_mask = 0;
    while(count!=0)
    {
        cal_subnet_mask += pow(2,8-count);
        count--;
    }
    if(network_class == 'A')
    {
        cout<<"\n\t Calculated subnet mask is 255."<<cal_subnet_mask<<".0.0\n\n";
    }
    else if(network_class == 'B')
    {
        cout<<"\n\t Calculated Subnet Mask is 255.255."<<cal_subnet_mask<<".0\n\n";
    }
    else
    {
        cout<<"\n\t Calculated Subnet Mask is 255.255.255."<<cal_subnet_mask<<"\n\n";
    }

    if(network_class == 'A')
    {
        host_workable = pow(2,24-borrow_host_bits) - 2;
    }
    if(network_class == 'B')
```

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    {
        host_workable = pow(2,16-borrow_host_bits) - 2;
    }
    if(network_class == 'C')
    {
        host_workable = pow(2,8-borrow_host_bits) - 2;
    }
    cout<<"\n\t Total workable hosts  in each subnetwork are "<<host_workable<<"\n\n";

    host_in_each_subnetwork = pow(2,8-borrow_host_bits);
    iprange = 0;
    for(int i=1; i<=subnetworks; i++)
    {
        cout<<"\n\t Network "<<i<<" : "<<gen_ip<<iprange<<" -
"<<gen_ip<<iprange+host_in_each_subnetwork-1<<endl;
        iprange += host_in_each_subnetwork;
    }

    return 0;
}
```

OUTPUT :-

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    Enter The IP Address : 192.168.1.0

    IP Address Belongs To class C


    Default Subnet Mask is 255.255.255.0


    How Many Subnetworks You Want To Create : 16

    Need To Borrow 4 host bits


    Calculated Subnet Mask is 255.255.255.240


    Total workable hosts  in each subnetwork are 14


    Network 1 : 192.168.1.0 - 192.168.1.15

    Network 2 : 192.168.1.16 - 192.168.1.31

    Network 3 : 192.168.1.32 - 192.168.1.47

    Network 4 : 192.168.1.48 - 192.168.1.63

    Network 5 : 192.168.1.64 - 192.168.1.79

    Network 6 : 192.168.1.80 - 192.168.1.95
```

Network 7 : 192.168.1.96 - 192.168.1.111

Network 8 : 192.168.1.112 - 192.168.1.127

Network 9 : 192.168.1.128 - 192.168.1.143

Network 10 : 192.168.1.144 - 192.168.1.159

Network 11 : 192.168.1.160 - 192.168.1.175

Network 12 : 192.168.1.176 - 192.168.1.191

Network 13 : 192.168.1.192 - 192.168.1.207

Network 14 : 192.168.1.208 - 192.168.1.223

Network 15 : 192.168.1.224 - 192.168.1.239

Network 16 : 192.168.1.240 - 192.168.1.255