COMPUTER COMMUNICATION NETWORKS

LAB EXPERIMENT 12

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AIM: To perform subnetting on different Networks. Try different examples to demonstrate subnetting and find subnet masks or give IP address of different classes in given network id and subnet

Theory: IP addresses enable computers to communicate by providing unique identifiers for the computer itself and for the network over which it is located. An IP address is a 32 bit value that contains a network identifier(net -id) and a host identifier (host-id). The network administrators need to assign IP addresses to the system on their network. This address needs to be a unique one. All the computers on a particular subnet will have the same network identifier but different host identifiers. The Internet Assigned Numbers Authority (IANA) assigns network identifiers to avoid any duplication of addresses.
Host Identifier Network Identifier 32 bits
The 32 bit IPv4 address is grouped into groups of eight bits, separated by dots. Each 8 bit group is then converted into its equivalent binary number. Thus each octet (8bit) can take value from 0 to 255. The IPv4 in the dotted decimal notation can range from

0.0.0.0 to 255.255.255.255. The IPv4 Address are classified into 5 types as follows:

1. Class A   2. Class B
3. Class C   4. Class D
5. Class E

Class A

The first bit of the first octet is always set to 0 (zero). Thus the first octet ranges from 1-127 i.e.

00000000 - 01111111

1-127

Class A addresses only include IP starting from 1.x.x.x to 126.x.x.x only. The IP range 127.x.x.x is reserved for loopback IP addresses. The default subnet mask for class Class A IP address is 255.0.0.0 which implies that Class A addressing can have 126 networks and 167777214 hosts. Class A IP address format is thus :

0NNNNNNN.HHHHHHHH.HHHHHHHH.HHHHHHHH

Class B

An IP address which belongs to class B has the first two bits in the first octet set to 10, i.e.

10000000 - 10111111

128 - 191

Class B IP Addresses range from 128.0.x.x to 191.255.x.x. The default subnet mask for Class B is 255.255.x.x. Class B has 16384 Network addresses and 65534 Host addresses. Class B IP addresses format is:

10NNNNNN.NNNNNNNN.HHHHHHHH.HHHHHHHH

Class C

The first octet of Class C IP address has its first 3 bits set to 110,that is:

11000000 - 11011111

192 - 223

Class C IP addresses range from 192.0.0.x to 223.255.255.x. The default subnet mask for Class C is 255.255.255.x. Class C gives

2097152 Network addresses and 254 Host addresses. Class C IP address format is :
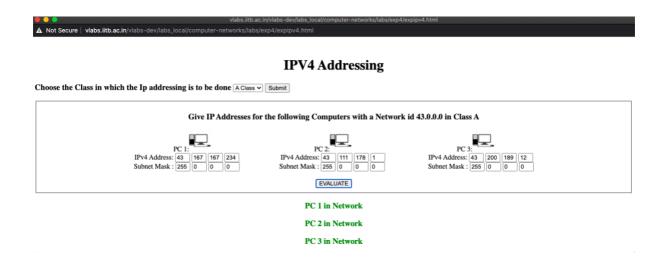110NNNNN.NNNNNNNN.NNNNNNNN.HHHHHHHH

PRE-TEST SCREENSHOT:

IPv4 Addressing

Pre Test

1) Which IP addresses is automatically assigned by DHCP Server ?
○ Static IP Addresses
◉ Dynamic IP Addresses

2) Default network mask for CLASS C is
○ 255.0.0.0
○ 255.255.0.0
◉ 255.255.255.0
○ 255.255.255.255

3) IPv4 Address is
○ 8bit
○ 16bit
◉ 32bit
○ 64bit
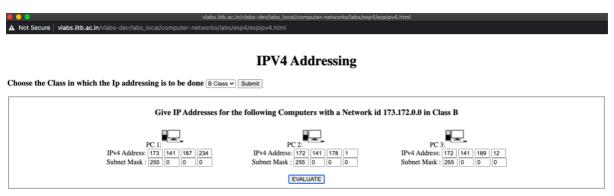
[Evaluate]

1) Correct

2) Correct

3) Correct

PROCEDURE:
1. The aim is to Give IP Addresses to the PCs.
2. To perform the experiment follow the below steps
3. A choice list would be given defining the Classes
4. The user has to select the class in which they choose to give IP Addresses
5. After that a Network ID would be given and the user has to enter the IP Addresses according to the Network ID.
6. Click on submit to test whether the IP address given to PCs make them into Network or not.
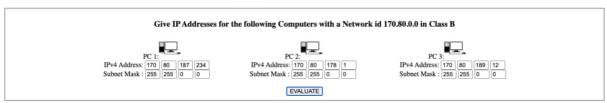
OUTPUTS:

Class A:

Class B:

IPV4 Addressing

Choose the Class in which the Ip addressing is to be done B Class ▾ Submit

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Give IP Addresses for the following Computers with a Network id 170.80.0.0 in Class B

PC 1:
IPv4 Address: 170 80 187 234
Subnet Mask : 255 255 0 0

PC 2:
IPv4 Address: 170 80 178 1
Subnet Mask : 255 255 0 0

PC 3:
IPv4 Address: 170 80 189 12
Subnet Mask : 255 255 0 0

EVALUATE

PC 1 in Network

PC 2 in Network

PC 3 in Network

Class C:

IPV4 Addressing

Choose the Class in which the Ip addressing is to be done C Class ▾ Submit

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Give IP Addresses for the following Computers with a Network id 214.100.161.0 in Class C

PC 1:
IPv4 Address: 214 100 161 234
Subnet Mask : 255 255 0 0

PC 2:
IPv4 Address: 214 100 161 1
Subnet Mask : 255 255 0 0

PC 3:
IPv4 Address: 214 100 161 12
Subnet Mask : 255 255 0 0

EVALUATE

PC 1 NOT in Network

PC 2 NOT in Network

PC 3 NOT in Network

IPV4 Addressing

Choose the Class in which the Ip addressing is to be done C Class ▾ Submit

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Give IP Addresses for the following Computers with a Network id 214.100.161.0 in Class C

PC 1:
IPv4 Address: 214 100 161 234
Subnet Mask : 255 255 255 0

PC 2:
IPv4 Address: 214 100 161 1
Subnet Mask : 255 255 255 0

PC 3:
IPv4 Address: 214 100 161 12
Subnet Mask : 255 255 255 0

EVALUATE

PC 1 in Network

PC 2 in Network

PC 3 in Network

POST TEST SCREENSHOT:

IPv4 Addressing

Post Test

1) How many bits are there in the MAC(Media Access control) Address
- ○ 64bits
- ● 48bits
- ○ 32bits
- ○ 16bits

2) Which of the following IP Address is valid for A Class
- ○ 172.32.4.2
- ○ 192.136.42.1
- ○ 128.4.2.1
- ● 10.2.3.1

[Evaluate]

1) Correct

2) Correct

CONCLUSION: From this experiment with the help of the Virtual Labs we gained the knowledge of the concept of Subnetting and how to assign IP addresses and subnets to various connection and classes. We also understood the differences between the 3 Major classes of subnets.