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Assignment - 03

* Aim :- Write a program to demonstrate subnetting and find the subnet masks.

* Objectives: i) To understand structure of IP addresses and subnet masks.
ii) To understand concept of Subnetting & create subnet of given IP address.

* Requirements: Windows 10 bit 64 bit, Intel i5 processor, IntelliJ IDE, jdk 8.

* Theory:

Subnetting:

Subnetting is when you enter a lease with someone else, known as a subtenant for an apartment or other property which you already rent. Subnetting is usually used when you are exiting the lease is up & don't work want to spend money to continue renting the property which you don't inhabit. Subnetting lets you essentially act as a sort of mini landlord for property you were renting to keep yourself from playing for something you are not using.

Netmask:

A network is a 32-bit mask used to divide an IP address into subnets & specify the networks

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available hosts. In a netmask two bits are always automatically assigned for eg. in 255.255.255.0 "0" is the assigned bit network address. It is always assigned & cannot be used.

Below is an example of netmask & an example of its binary conversion.

Netmask :	255.	255.	255.	255
Binary :	11111111	11111111	11111111	11111111
Netmask length	8	16	24	32

counting out the bits in the binary conversion allows you to determine netmask length.
A commonly used netmask is a 24-bit netmask, as seen below.

Netmask :	255.	255.	255.	0.
Binary :	11111111	11111111	11111111	00000000
Netmask length:	8	16	24	- - -

Using a 24-bit netmask, the network would be capable of 2,097,150 networks or 254 different hosts with an IP range of 192.1.0.x to 223.255.254.x which is usually more than enough addresses for one network. A simple formula can be used to determine the capable amount of networks a netmask can support

$2^{(\text{Netmask length} - \#\text{ of used segment})} - 2$

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For eg. if we used a netmask length of 24, having a netmask of 255.255.255.0 with 3 used segments, subtract 3 from netmask length i.e., 24-3=21. With this number of networks you are subtracting 2 from this number because of the broadcast & new addresses that are already being used.

Another example of a netmask length of 16, there would be 16 zeroes. The formula in this case would be $2^{(\#\text{ of zeroes})} - 2$ ∴

∴ $2^{16} - 2 = 65,534$ total number of hosts.

Below is a breakdown of each of the commonly used network classes.

Class	Netmask length	# of Network	# of hosts	Netmask
class A	8	126	16777214	255.0.0.0
class B	16	16,382	65534	255.255.0.0
class C	24	2097153	254	255.255.255.0
~~class~~ D				

Subnet Masks:

Subnet mask is a mask used to determine what subnet an IP address belongs to. An IP address has 2 components, the network address and host address. For eg, Consider IP address 150.215.017.009. Assuming this is a part of class B network, the first 2 numbers (150,215) represent the class B network address, and the second other 2 numbers (017,009) identify a particular host on this network.

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If this network is divided into 14 subnets, however, the first 4 bits of host address are for identifying the subnet.

The subnet mask is network address plus the bits reserved for identifying the subnetwork by convention, the bits for network address are set to 1, though it would also work if the bits were set exactly as in network address.

In case, subnet mask would be the 11111111 · 11111111 · 11110000 · 0000000 It is called mask because it can be used to identify the subnet to which IP addresses belongs by performing a bitwise AND operation com on the mask & IP address

The result is subnet address:

Subnet mask 255 · 255 · 240 · 0000
11111111 · 11111111 · 11110000 · 00000000

IP address 150 · 215 · 17 · 9
10010110 · 11010111 · 00010001 · 00001001

Subnet mask 150 · 215 · 016 · 0000
10010110 · 11010111 · 00010000 · 00000000

The subnet address therefore is 150 · 215 · 016 · 000

* Conclusion:

Hence we studied and implement program to demonstrate subnetting and find the subnet masks.

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