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Assignment 3

Title: Subnetting

Problem Statement: Write a program in Java/Python to demonstrate subnetting and find the subnet masks.

Requirements: Fedora 20 with Pentium IV and above, 1 GB RAM, 120 G.B HDD, Monitor, Keyboard, Mouse Modelio, Eclipse, CDT, Python interpreter, Pydev, J2SE

Learning objective: To understand network, IP addressing and subnetting and need for subnetting.

Learning outcome:
Students will be able to:
- Demonstrate subnetting in a particular programming language
- Find how many hosts per subnet are available
- Find how many subnets does the chosen subnet mask produce

Concepts related theory:

1. Subletting

Subletting is when you enter a lease with someone else, known as a subtenant, for an apartment or other property which you already rent. Subletting is usually used when you're renting a property and need to leave the property before the lease is up and don't want to spend the money to continue renting the property which you don't inhabit. Subletting lets you essentially act as a sort of mini-landlord for the property you were renting to keep yourself from paying for something you're not using.

2. Netmask

A netmask is a 32-bit mask used to divide an IP address into subnets and specify the network's available hosts. In a netmask, two bits are always automatically assigned. For example, in 255.255.225.0, "0" is the assigned network address. In 255.255.255.255, "255" is

the assigned broadcast address. The 0 and 255 are always assigned and cannot be used.

Below is an example of a netmask
Netmask: 255. 255. 255. 255
Netmask length 8 16 24 32

A simple formula can be used to determine the capable amount of networks a netmask can support.
2^(netmask length -# of used segment) – 2

Class	NetmaskLength	# of networks	# of hosts	Netmask
Class A	8	126	16777214	255.0.0.0
Class B	16	16382	65534	255.255.0.0
Class C	24	2097150	254	255.255.255.0

3. Subnet Masks
Subnet mask is a mask used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address. For example, consider the IP address 150.215.017.009. Assuming this is part of a Class B network, the first two numbers (150.215) represent the Class B network address, and the second two numbers (017.009) identify a particular host on this network.

Short for subnetwork mask, a subnet mask is data used for bitwise operations on a network of IP addresses that has been divided into two or more groups. This process, known as subnetting, divides an IP network into blocks of logical addresses. Subnetting can improve security and help to balance overall network traffic. A common example of a subnet mask for class C IP addresses is 255.255.255.0, the default subnet mask for many computers and network routers. When applied to subnet, a subnet mask shows the routing prefix.

Subnetting enables the network administrator to further divide the host part of the address into two or more subnets. In this case, a part of the host address is reserved to identify the

particular subnet. This is easier to see if we show the IP address in binary format.

The full address is:
1001 0110 1101 0111 0001 0001 0000 1001
The Class B network part is:
100 10110 1101 0111
The host address is:
0001 0001 0000 1001

If this network is divided into 14 subnets, however, then the first 4 bits of the host address (0001) are reserved for identifying the subnet. The subnet mask is the network address plus the bits reserved for identifying the subnetwork -- by convention, the bits for the network address are all set to 1, though it would also work if the bits were set exactly as in the network address. In this case, therefore, the subnet mask would be 11111111 11111111 11110000 00000000. It's called a mask because it can be used to identify the subnet to which an IP address belongs by performing a bitwise AND operation on the mask and the IP address. The result is the subnetwork address:

Subnet Mask 255.255.240.000 11111111 11111111 11110000 00000000
IP Address 150.215.017.009 1001 0110 1101 0111 0001 0001 0000 1001
Subnet Address 150.215.016.000 1001 0110 1101 0111 0001 0000 0000 0000
The subnet address, therefore, is 150.215.016.000.

Outcomes:
The output will be the subnet mask of the given IP address of the host.