**Assignment No.:**

**Title:** Subnetting

**Aim:** Consider the network id 192.168.4.0 or such relevant IP and create four subnets namely A, B, C, D. Assign the subnet mask. Write a Python \ C++ program to Perform the following operations (use overloading if applicable).

a) Ping the machine of same subnet.

b) Ping the machine in subnet A from machine of subnet B.

c) Analyze the output of the above sub assignments.

**Objective:** To demonstrate internal and external pings using subnetting.

**Theory:**

A subnetwork, or subnet, is a logical, visible subdivision of an [I](http://www.google.com/url?q=http%3A%2F%2Fen.wikipedia.org%2Fwiki%2FIP_network&sa=D&sntz=1&usg=AFQjCNHYFpiQlNtyKPgpCI9_Uek7YoVQ2w)P network. The practice of dividing a network into two or more networks is called subnetting. Computers that belong to a subnet are addressed with a common, identical, most-significant bit-group in their IP address. This results in the logical division of an IP address into two fields, a network or routing prefix and the rest field or host identifier. The rest field is an identifier for a specific host or network interface.

The routing prefix is expressed in CIDR notation. It is written as the first address of a network, followed by a slash character (*/*), and ending with the bit-length of the prefix. For example, 192.168.1.0/24 is the prefix of the Internet Protocol Version 4 network starting at the given address, having 24 bits allocated for the network prefix, and the remaining 8 bits reserved for host addressing. The IPv6 address specification 2001:db8::/32 is a large address block with 296 addresses, having a 32-bit routing prefix. For IPv4, a network is also characterized by its **subnet mask**, which is the bitmask that when applied by a bitwise AND operation to any IP address in the network, yields the routing prefix. Subnet masks are also expressed in dot-decimal notation like an address. For example, 255.255.255.0 is the network mask for the 192.168.1.0/24 prefix.

**Creating subnets:**

1. Get a router. Plug four PCs into the router.
2. Configure a new network on each PC.
3. For two PCs, set the IP address to belong to one particular subnet. eg. 100.0.0.1/28 and 100.0.0.2/28
4. For the other two, set the IP address to belong to another subnet. eg. 192.0.0.16/28 and 192.0.0.17/28.
5. Now, you have two PCs on one subnet and two on another - on the same network. Try pinging them from one another.

The reason the ping succeeds even on different subnets is that the ARP broadcast, once it receives no response on its own subnet, gets the IP address of the other subnet through the router.

**How subnet masks work:**

The subnet mask specifies what part of the IP address refers to the subnet. Consider the above examples - 192.0.0.1/28 and 192.0.0.9/28. The /28 indicates that the 28 most significant bits of the mask are set.

The subnet mask is, therefore, 11111111.11111111.11111111.11110000. Now, the IP addresses are 11000000.00000000.00000000.00000001 and 1000000.00000000.00000000.

00001001. These are class C IP addresses - the first 24 bits indicate the network. ANDing these with the subnet mask, we get:

11000000.00000000.00000000.00000000 and

11000000.00000000.00000000.00010000

Indicating that the two belong to separate subnets.

**Platform/ Languages used:**

**Conclusion:** Therefore, we have successfully set up four PCs in two subnets and pinged them from each other.

**FAQs:**

1. Differentiate between subnetting and supernetting?
2. What is private IP addressing? Give the ranges of it.
3. Divide the network 220.125.5.192/26 into 8 subnetworks .How many hosts can be connected in each network? Show IP range of each subnet.