Networks Lab

Week 9

IP Allocation

21BCE1889

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Code :

```
def to_binary(address):
    return ''.join(format(int(octet), '08b') for octet in address.split('.'))

def to_address(binary):
    return '.'.join(str(int(binary[i:i+8], 2)) for i in range(0, 32, 8))

def assign_subnets(ip_address, num_subnets):
    ip_address_bin = to_binary(ip_address)
    subnet_mask_bin = ''

    first_bit = ip_address_bin[0]
    second_bit = ip_address_bin[1]
    third_bit = ip_address_bin[2]

    if first_bit == '0':
        subnet_mask_bin = '11111111000000000000000000000000'
    elif first_bit == '1' and second_bit == '0':
        subnet_mask_bin = '11111111111111110000000000000000'
    elif first_bit == '1' and second_bit == '1' and third_bit == '0':
        subnet_mask_bin = '11111111111111111111111100000000'
    else:
        print("Invalid IP address class.")
        return

    network_prefix = subnet_mask_bin.index('0')
    host_bits = 32 - network_prefix

    for i in range(num_subnets):
        num_hosts = int(input(f"Enter the number of hosts for subnet {i + 1}: "))
        subnet_bits = host_bits - num_hosts.bit_length() - 2
```

```
        subnet_mask_bin = '1' * (network_prefix + subnet_bits) + '0' * (host_bits - subnet_bits)

        network_address_bin = ip_address_bin[:network_prefix + subnet_bits] + '0' * (host_bits - subnet_bits)
        network_address = to_address(network_address_bin)

        broadcast_address_bin = ip_address_bin[:network_prefix + subnet_bits] + '1' * (host_bits - subnet_bits)
        broadcast_address = to_address(broadcast_address_bin)

        print(f"Subnet {i + 1}:")
        print(f"Subnet mask: {to_address(subnet_mask_bin)}")
        print(f"Network address: {network_address}")
        print(f"Usable IP addresses: {network_address} - {to_address(to_binary(broadcast_address)[:-1])}\n")

        ip_address_bin = bin(int(network_address_bin, 2) + int(subnet_mask_bin, 2) + 1)[2:].zfill(32)

ip_address = input("Enter the IP address: ")
num_subnets = int(input("Enter the number of subnets: "))

assign_subnets(ip_address, num_subnets)
```

O/P :

```
Enter the IP address: 200.55.1.0
Enter the number of subnets: 6
Enter the number of hosts for subnet 1: 100
Subnet 1:
Subnet mask: 255.255.254.0
Network address: 200.55.0.0
Usable IP addresses: 200.55.0.0 - 200.55.1.127

Enter the number of hosts for subnet 2: 40
Subnet 2:
Subnet mask: 255.255.255.0
Network address: 228.27.127.0
Usable IP addresses: 228.27.127.0 - 228.27.127.127

Enter the number of hosts for subnet 3: 20
Subnet 3:
Subnet mask: 255.255.255.128
Network address: 242.13.191.0
Usable IP addresses: 242.13.191.0 - 242.13.191.63

Enter the number of hosts for subnet 4: 10
Subnet 4:
Subnet mask: 255.255.255.192
Network address: 249.6.223.64
Usable IP addresses: 249.6.223.64 - 249.6.223.63

Enter the number of hosts for subnet 5: 6
Subnet 5:
Subnet mask: 255.255.255.224
Network address: 252.131.111.128
Usable IP addresses: 252.131.111.128 - 252.131.111.79

Enter the number of hosts for subnet 6: 2
Subnet 6:
Subnet mask: 255.255.255.240
Network address: 254.65.183.176
Usable IP addresses: 254.65.183.176 - 254.65.183.95
```