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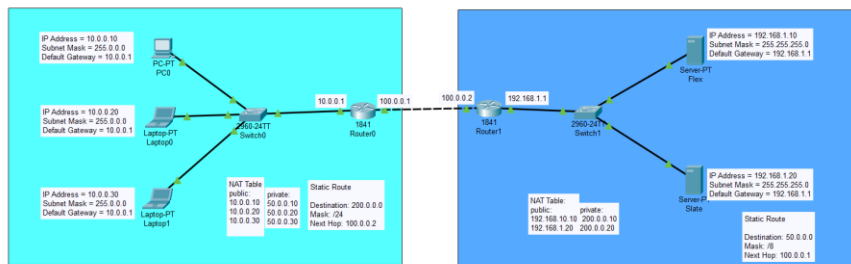
Section: BCS-5A

LAB 12 TASK

## Network Address Translation (NAT)

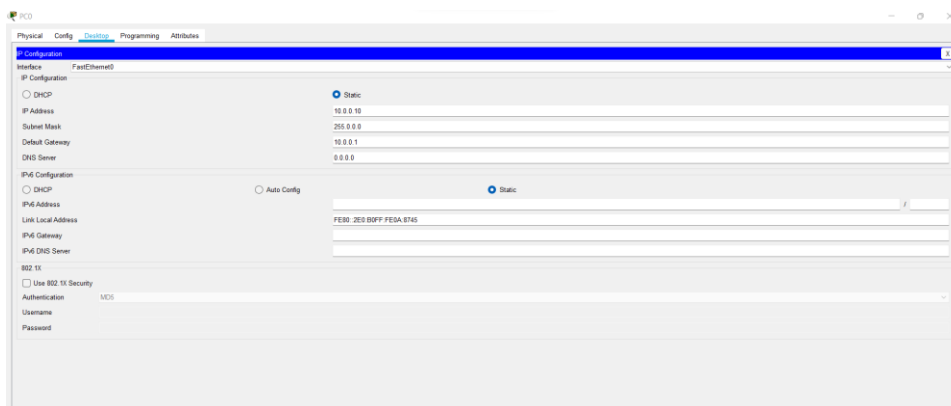
**Task: Implement the S-NAT for web server of (flex and slate) in a single topology.**

**Step1:** Create this topology in the packet tracer.



**Step2:** Assign Ip addresses, default mask and default gateway to all PC's and Server.

PC0:



## Laptop0:

The screenshot shows the configuration window for a device named 'Laptop0'. The 'Configuration' tab is active. The 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected. The 'IPv4 Configuration' section has 'Static' selected. The 'IPv6 Configuration' section has 'Static' selected. The '802.1X' section has 'Use 802.1X Security' unchecked. The 'Authentication' dropdown is set to 'MD5'. The 'Username' and 'Password' fields are empty.

Field	Value
Interface	FastEthernet0
IP Configuration	Static
IP Address	10.0.0.20
Subnet Mask	255.0.0.0
Default Gateway	10.0.0.1
DNS Server	0.0.0.0
IPv4 Configuration	Static
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::203:0:0:0:0:0:0:0
IPv6 Gateway	
IPv6 DNS Server	
802.1X	Use 802.1X Security
Authentication	MD5
Username	
Password	

## Laptop1:

The screenshot shows the configuration window for a device named 'Laptop1'. The 'Configuration' tab is active. The 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected. The 'IPv4 Configuration' section has 'Static' selected. The 'IPv6 Configuration' section has 'Static' selected. The '802.1X' section has 'Use 802.1X Security' unchecked. The 'Authentication' dropdown is set to 'MD5'. The 'Username' and 'Password' fields are empty.

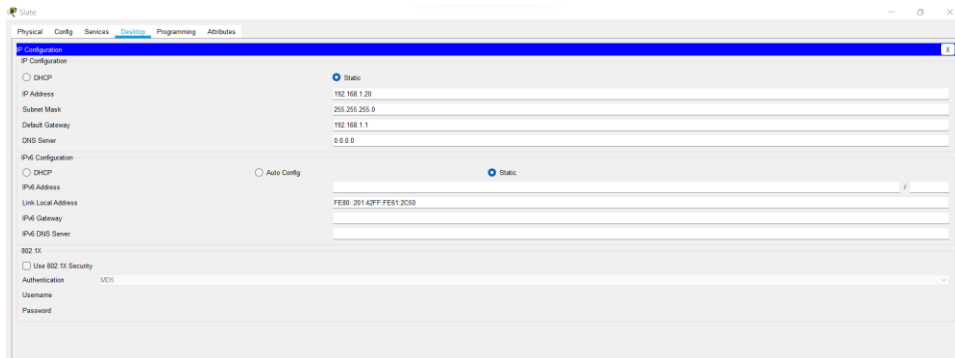
Field	Value
Interface	FastEthernet0
IP Configuration	Static
IP Address	10.0.0.30
Subnet Mask	255.0.0.0
Default Gateway	10.0.0.1
DNS Server	0.0.0.0
IPv4 Configuration	Static
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::203:0:0:0:0:0:0:0
IPv6 Gateway	
IPv6 DNS Server	
802.1X	Use 802.1X Security
Authentication	MD5
Username	
Password	

## Flex Server:

The screenshot shows the configuration window for a device named 'Flex'. The 'Configuration' tab is active. The 'Interface' is 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected. The 'IPv4 Configuration' section has 'Static' selected. The 'IPv6 Configuration' section has 'Static' selected. The '802.1X' section has 'Use 802.1X Security' unchecked. The 'Authentication' dropdown is set to 'MD5'. The 'Username' and 'Password' fields are empty.

Field	Value
Interface	FastEthernet0
IP Configuration	Static
IP Address	192.168.1.10
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0
IPv4 Configuration	Static
IPv6 Configuration	Static
IPv6 Address	
Link Local Address	FE80::206:0:0:0:0:0:0:0
IPv6 Gateway	
IPv6 DNS Server	
802.1X	Use 802.1X Security
Authentication	MD5
Username	
Password	

## Slate Server:



## Step3: Router 0 and Router 1 Configuration.

### Router 0 Configuration:

- Assign IP addresses to both router ends.
- Add public and private ip addresses
- Tell the router which interface is inside local and which interface is inside global.

Assigning IP addresses to both router Interfaces:

```
IOS Command Line Interface
Router(config-if)#ip address
% Incomplete command.
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#interface Ethernet0/1
%Invalid interface type and number
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 10.0.0.
      ^
% Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 100.0.0.1 255.0.0.0
Router(config-if)#ip address 100.0.0.1 255.0.0.0
Router(config-if)#no shutdown
```

Ctrl+F6 to exit CLI focus

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## Configure Static NAT

Static NAT configuration requires three steps: -

### 1. Define IP address mapping

```
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#ip nat inside source static 10.0.0.10 50.0.0.10
Router(config)#ip nat inside source static 10.0.0.20 50.0.0.20
Router(config)#ip nat inside source static 10.0.0.30 50.0.0.30
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

Ctrl+F6 to exit CLI focus

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### 2. Define inside local interface

```

Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#

```

Ctrl+F6 to exit CLI focus

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### 3. Define inside global interface

```

Router (config-if) #
Router (config-if) #
Router (config-if) #interface FastEthernet0/1
Router (config-if) #ip nat outside
Router (config-if) #

```

Ctrl+F6 to exit CLI focus

## Router 1 Configuration:

- Assign IP addresses to both router ends.
- Add public and private ip addresses
- Tell the router which interface is inside local and which interface is inside global.

### Assigning IP addresses to both router Interfaces:

```

Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 100.0.0.2 255.0.0.0
Router(config-if)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#

```

Ctrl+F6 to exit CLI focus

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## Configure Static NAT

Static NAT configuration requires three steps: -

### 1. Define IP address mapping

```
Router(config-if)#  
Router(config-if)#ip nat inside source static 192.168.1.10  
200.0.0.10  
Router(config)#ip nat inside source static 192.168.1.20  
200.0.0.20
```

### 2. Define inside local interface

```
Router(config-if)#  
Router(config-if)#  
Router(config-if)#interface FastEthernet0/1  
Router(config-if)#ip nat inside  
Router(config-if)#
```

### 3. Define inside global interface

```
Router(config)#  
Router(config)#interface FastEthernet0/0  
Router(config-if)#ip nat outside  
Router(config-if)#
```

Ctrl+F6 to exit CLI focus

## Step4: Static Routing for Router R0 and R1

### Static Routing for R0:

Router0

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Static Routes

Network

200.0.0.2

Mask

255.255.255.0

Next Hop

100.0.0.2

Add

Network Address

200.0.0.0/24 via 100.0.0.2

Remove

Equivalent IOS Commands

Router>

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**Static Routing for R1:**



Router1

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Static Routes

Network

50.0.0.0

Mask

255.0.0.0

Next Hop

100.0.0.1

Add

Network Address

50.0.0.0/8 via 100.0.0.1

Remove

Equivalent IOS Commands

Router#

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#

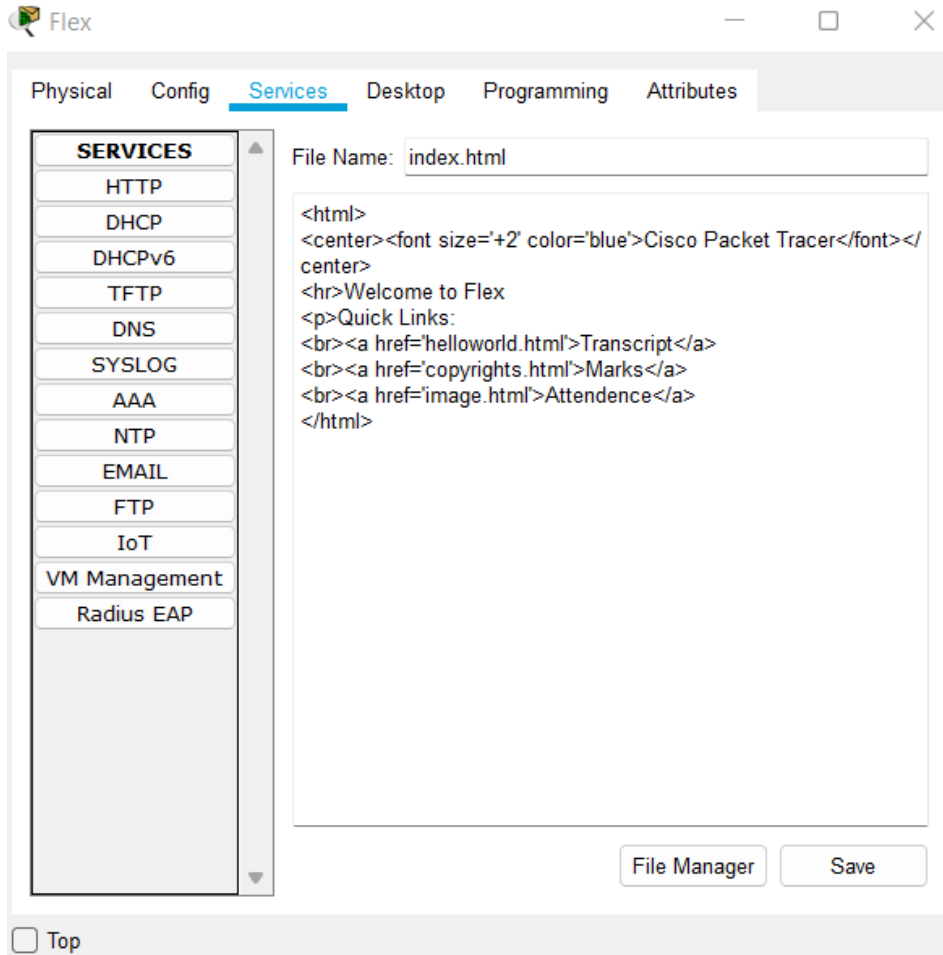
Router(config)#ip route 50.0.0.0 255.0.0.0 100.0.0.1

Router(config)#

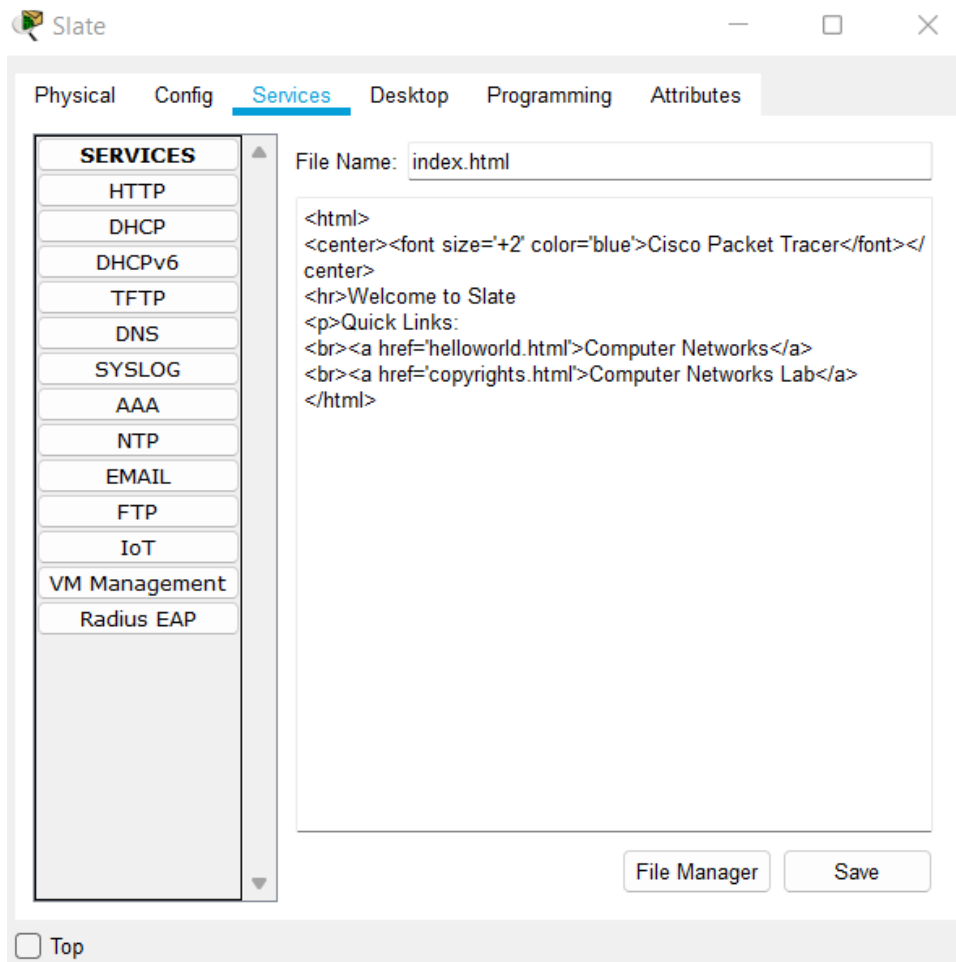
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**Step5: Edit the index.html file of Flex and Slate server.**

**Flex Server:**



**Slate Server:**



## Step 6: Verification

Now all the configuration are done. We can access the flex and slate with the help of public IP addresses. If we try to access it with private IP address then we would not able to do that.

### Pinging the Flex server with Public IP Address:

```
C:\>ping 200.0.0.10

Pinging 200.0.0.10 with 32 bytes of data:

Reply from 200.0.0.10: bytes=32 time<1ms TTL=126
Reply from 200.0.0.10: bytes=32 time<1ms TTL=126
Reply from 200.0.0.10: bytes=32 time=1ms TTL=126
Reply from 200.0.0.10: bytes=32 time<1ms TTL=126

Ping statistics for 200.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

### Pinging Flex Server with private IP address:

```
C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Request timed out.

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

### Why ping not successful with private IP address of Flex server?

Ans: We have pinged with IP address 192.168.1.10. This IP goes to the router and router then check that this IP address is available or not. There it does not find entry for the 192.168.1.10 because it's a private IP address. That's why router does not host with this IP. So, It will send the error back "Destination host unreachable".

### Pinging the Slate server with Public IP Address:

```
C:\>ping 200.0.0.20

Pinging 200.0.0.20 with 32 bytes of data:

Reply from 200.0.0.20: bytes=32 time<1ms TTL=126
Reply from 200.0.0.20: bytes=32 time<1ms TTL=126
Reply from 200.0.0.20: bytes=32 time<1ms TTL=126
Reply from 200.0.0.20: bytes=32 time<1ms TTL=126

Ping statistics for 200.0.0.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

### Pinging the Slate Server with Private IP Address:

```
C:\>ping 192.168.1.20

Pinging 192.168.1.20 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.

Ping statistics for 192.168.1.20:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

### Why ping not successful with private IP address of Flex server?

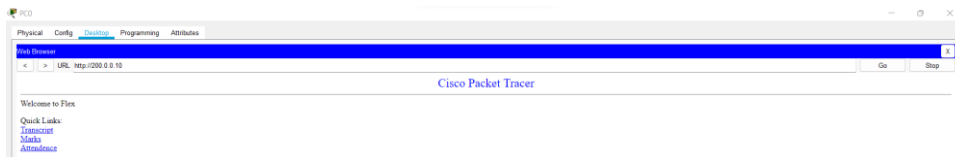
Ans: We have pinged with IP address 192.168.1.10. This IP goes to the router and router then check that this IP address is available or not. There it does not find entry for the 192.168.1.10 because it's a private IP address. That's why router does not host with this IP. So, It will send the error back "Destination host unreachable".

## Accessing Slate and Flex using web Browser with public IP addresses:

### Slate:



### Flex:



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