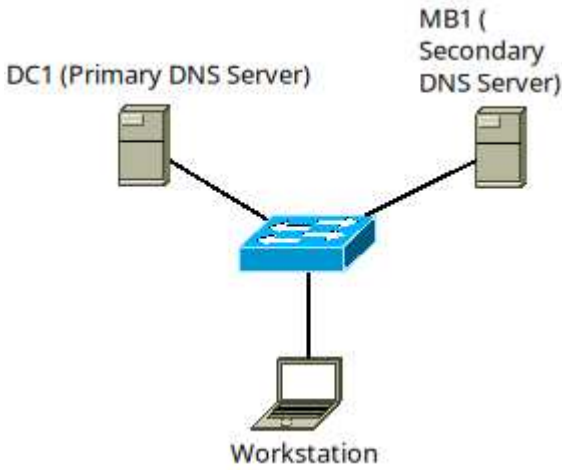
DNS

DNS, or Domain Name System, is a fundamental component of the internet that translates human-readable domain names into IP addresses. In other words, it is a hierarchical system that allows users to access websites and other internet resources using easy-to-remember domain names, such as www.example.com, instead of numerical IP addresses like 192.168.1.1.

Prerequisite

Before DNS can be set up, I need to set up the IP addresses and give them computer names. In this network design, I will have two servers, one called DC1 and the other MB1. I will connect them through a virtual switch called **Internal**.



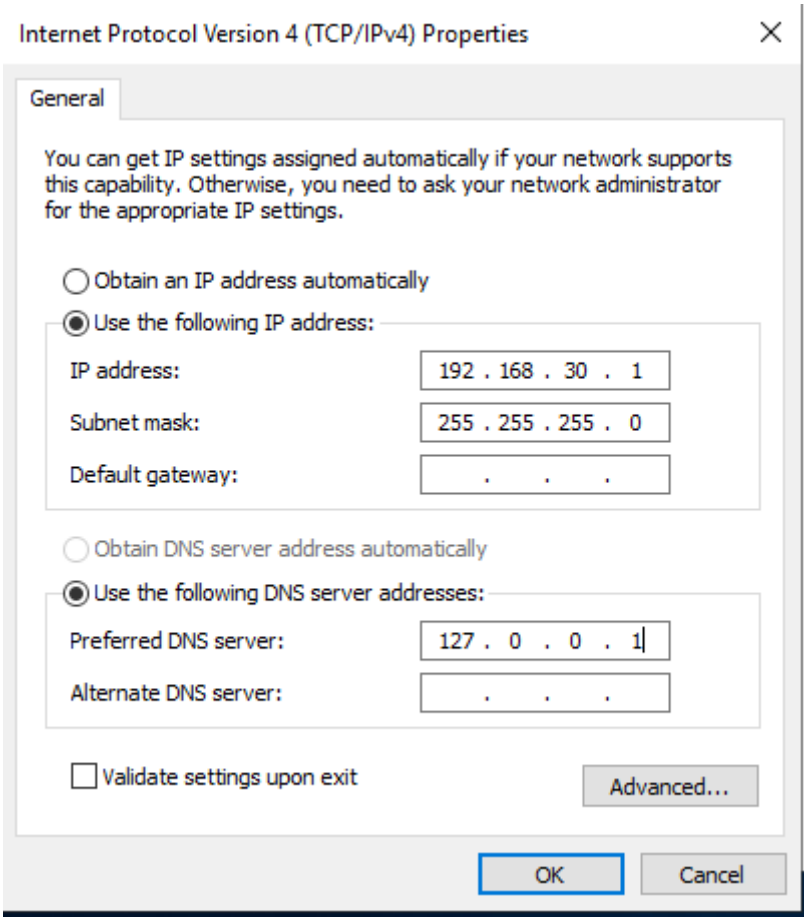
The following IP addresses will be applied:

- DC1 has IP address of 192.168.30.1/24 and preferred DNS Server address of 127.0.0.1.
- MB1 has IP address of 192.168.30.2/24 and preferred DNS Server address of 192.168.30.1.

Perform the following on DC1:

- Right click the Windows button and select **Run**.
- Type **ncpa.cpl** and click **OK**.

- Right click on Ethernet Connection and select **Properties**.
- Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.
- Enter the following details in the screenshot before clicking **OK**.



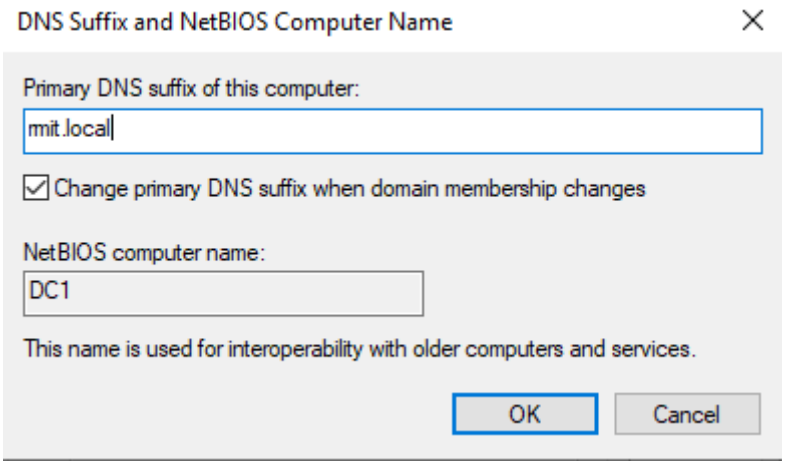
- Click **Close**.

The next thing to do is change the computer name.

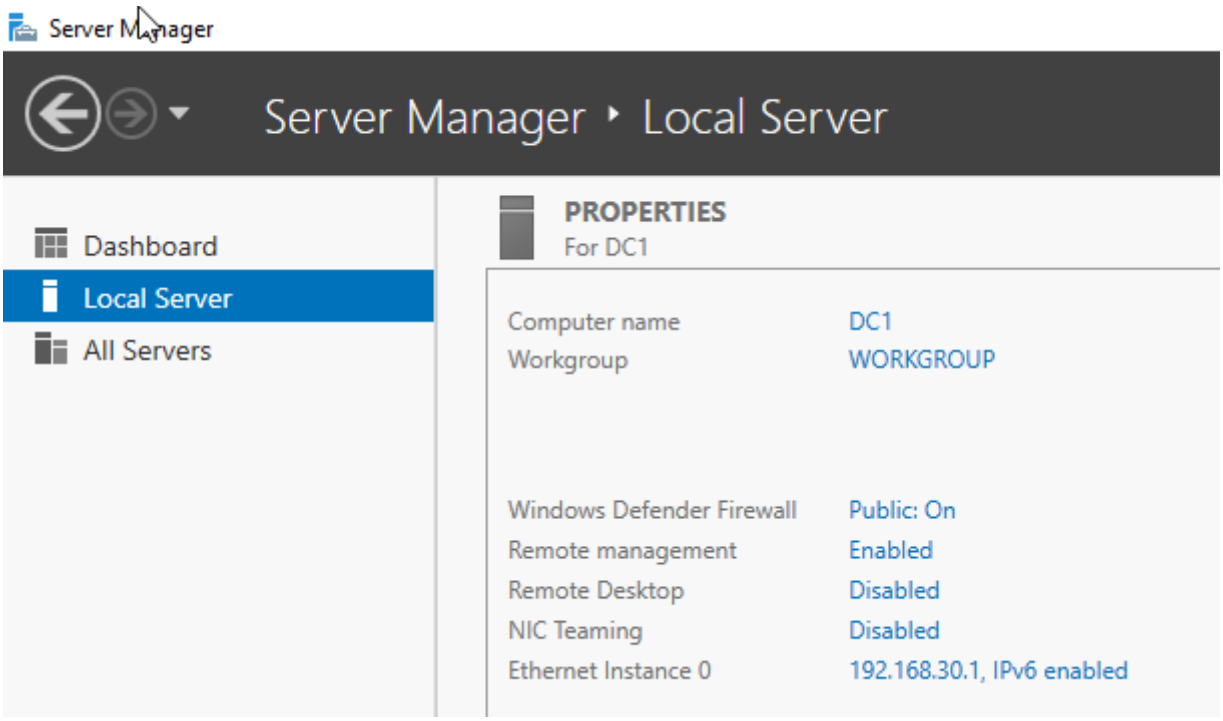
On DC1, do the following:

- Right click the Windows button and select **System**.
- Scroll down until you see **System Info**. Click it.
- Click **Change settings**.
- Click **Change**.

- For Computer Name, type **DC1**.
- Click the **More** button.
- Enter the following details before clicking **OK**.



- Click **OK**. Click **OK** to restart computer.
- Click **Close**.
- Click **Restart Now** to restart the virtual machine.
- Login as the administrator with your password.
- When Dashboard comes up, click **Local Server**.
- Verify your computer settings:



Exercise 1

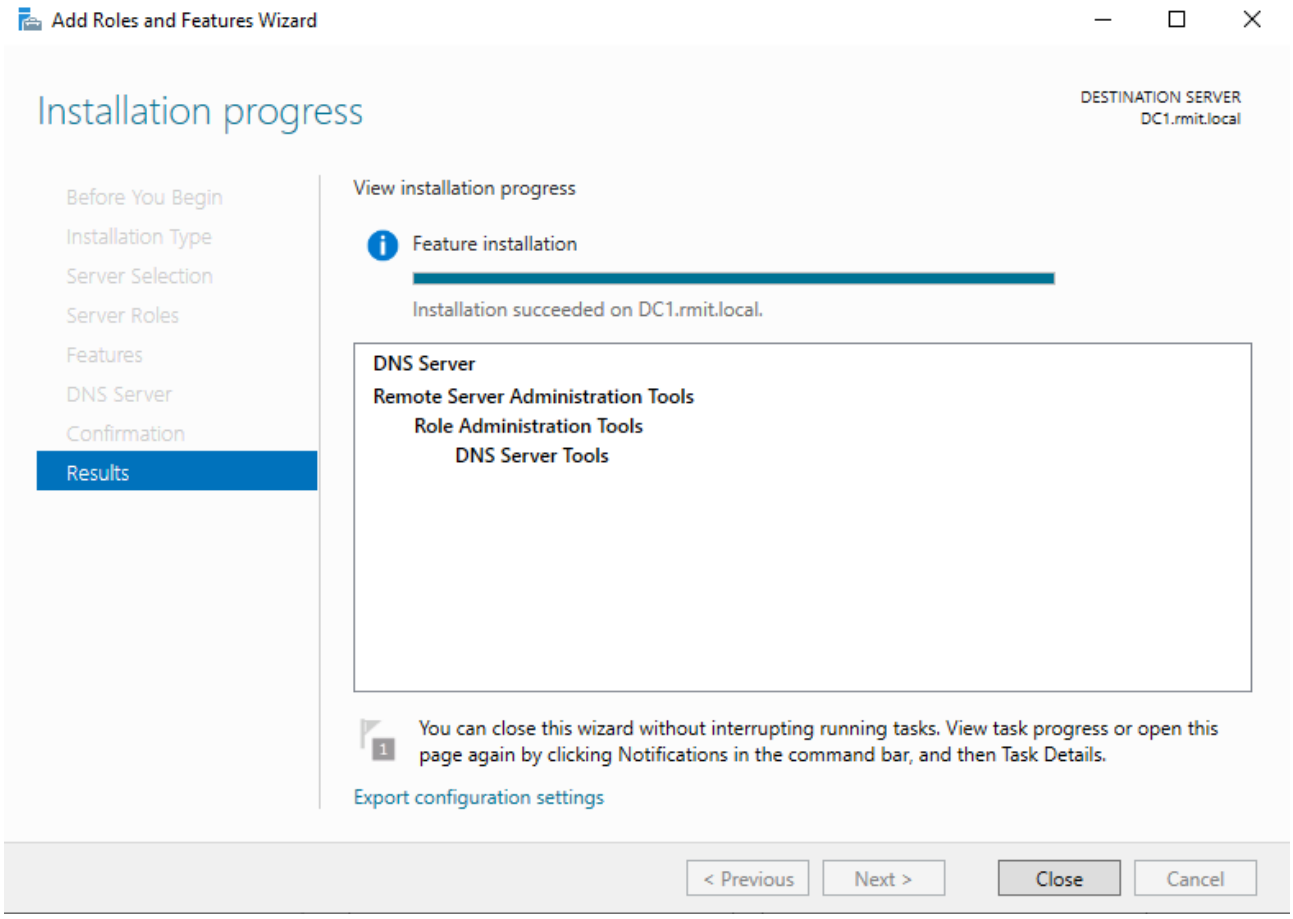
On MB1, do the following:

- Set the IP address to **192.168.30.2/24** while preferred DNS be set to **192.168.30.1**.
- Change the computer name to MB1.
- Use domain name **rmit.local**.

Now to install the DNS Server role. I will do this on DC1.

- In Server Manager, click **Add Roles or Features**.
- Click **Next**.
- Select **Role-based or feature-based installation**. Click **Next**.
- Select your server name and click **Next**.
- Tick **DNS Server**, if a window pops up, click **Add Features** to install the management software to configure DNS. Click **Next**.

- No features need to be installed, click **Next**.
- Read what DNS does and click **Next**.
- Click **Install**.
- Verify that DNS has been installed.



- Click **Close**.

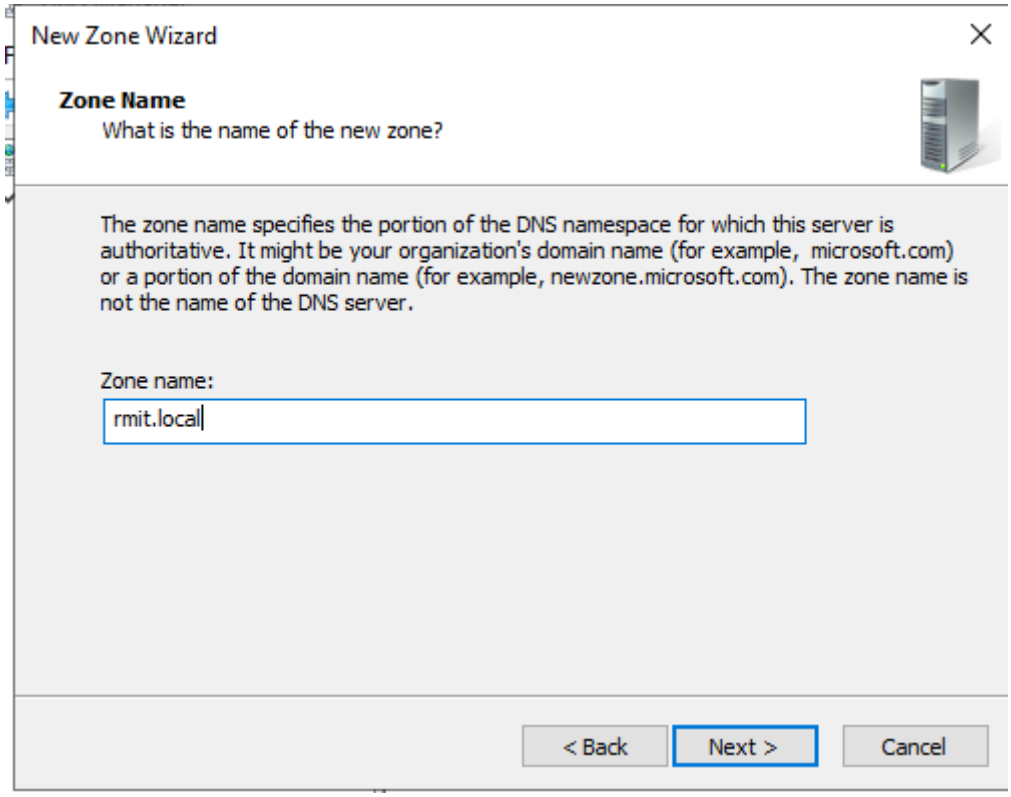
Exercise 2

On MB1, install the DNS Server service.

Configuring DNS Server Primary Zone

I will set up the DNS server on DC1. Perform the following:

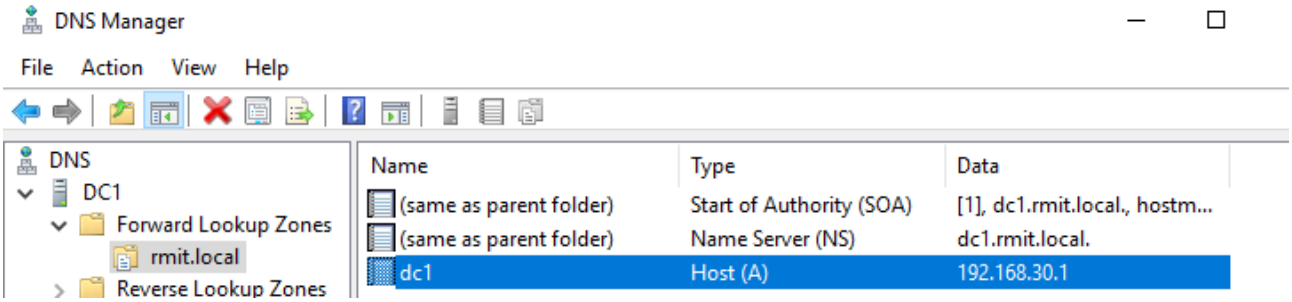
- Click **Tools** > **DNS** in Server Manager.
- Click on your server name, double click **Forward Lookup Zones**. Forward Lookup Zones allow you to resolve host names to IP addresses with the help of host records.
- Right click on Forward Lookup Zones, select **New Zone**.
- Click **Next**.
- Select **Primary Zone**. The first zone you create is always the Primary Zone.
- Click **Next**.
- Type in the following before clicking **Next**.



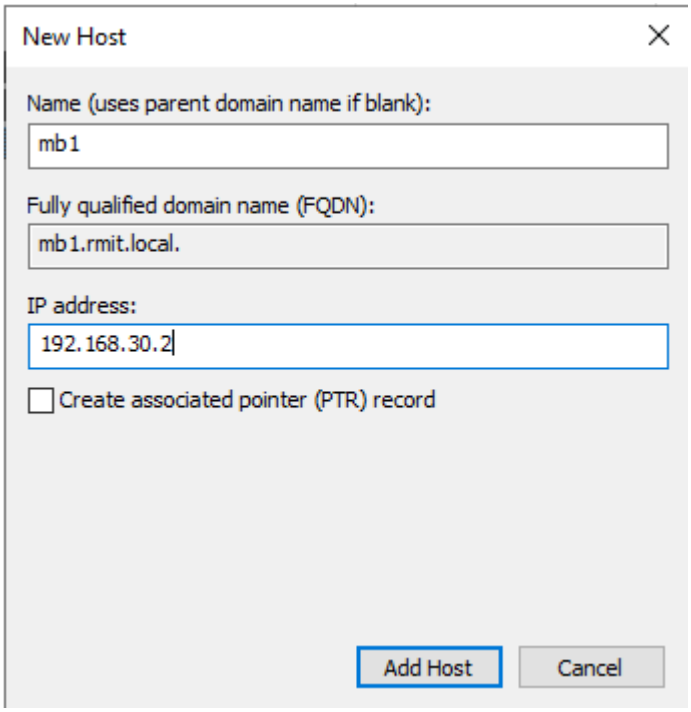
- Change nothing for the zone file, click **Next**.
- **Do not allow dynamic updates** and click **Next**.
- Click **Finish**. The zone is created.

Now to create the host records.

- Double click **rmit.local**.
- Notice the host record for dc1 has been created.



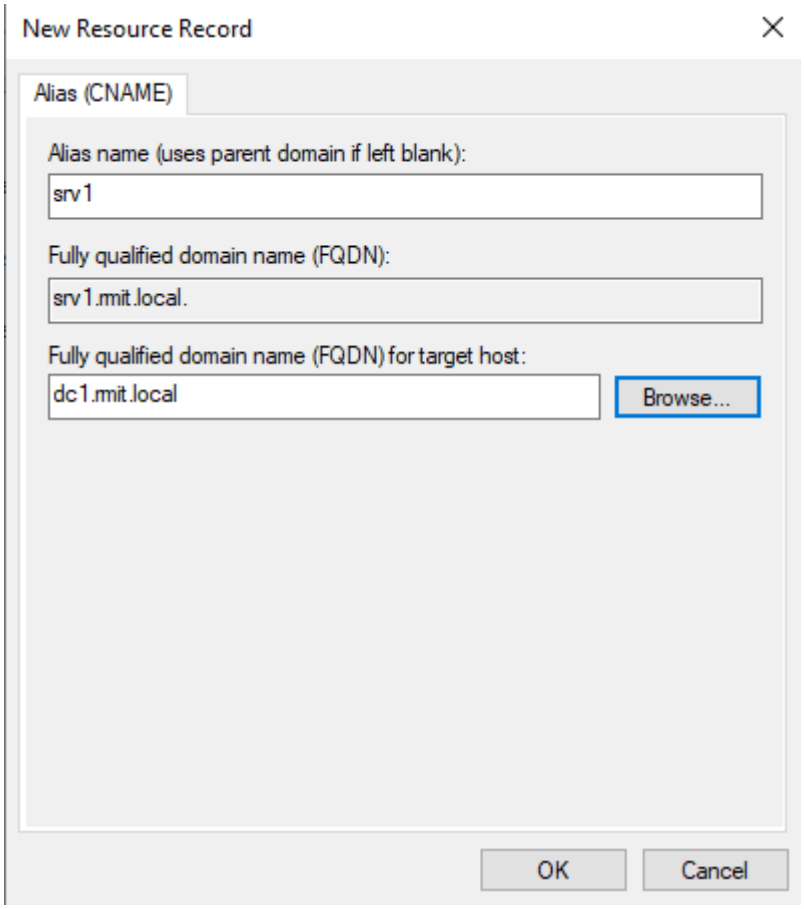
- Right click on rmit.local and click **New Host (A or AAAA)**.
- Type in the following before clicking **Add Host**.



- The host record has been created, click **OK**. Click **Done**.

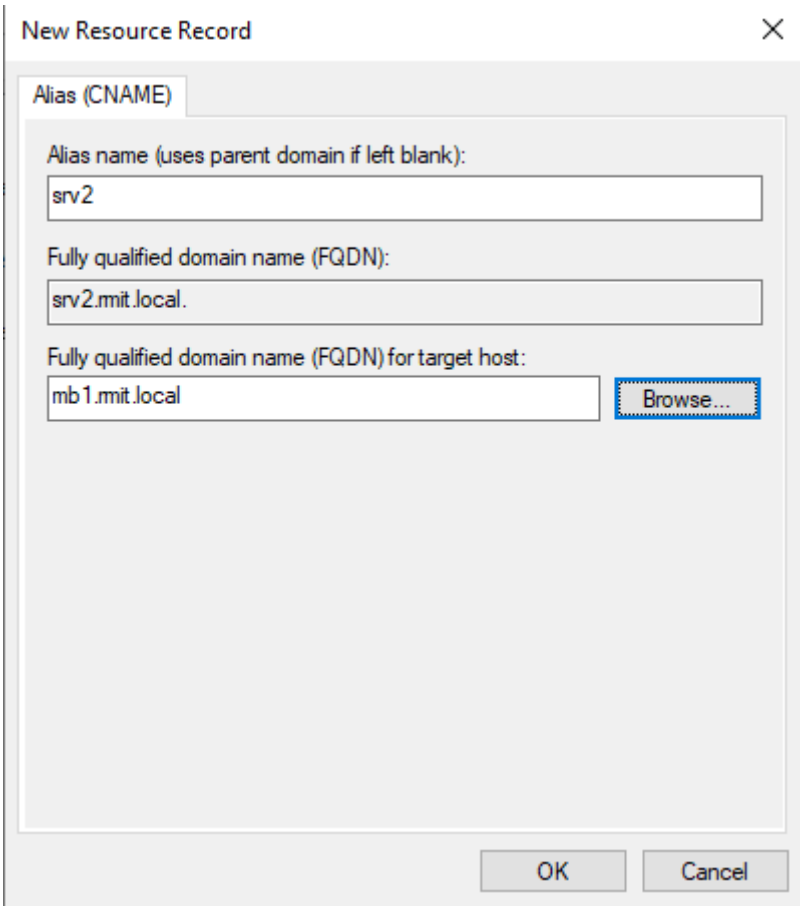
Host records can have alternative names called Alias names. These Alias records can be used to access other web sites on the same server.

- Right click on rmit.local.
- Click **New Alias (CNAME)**.
- Type in the following before clicking **OK**.

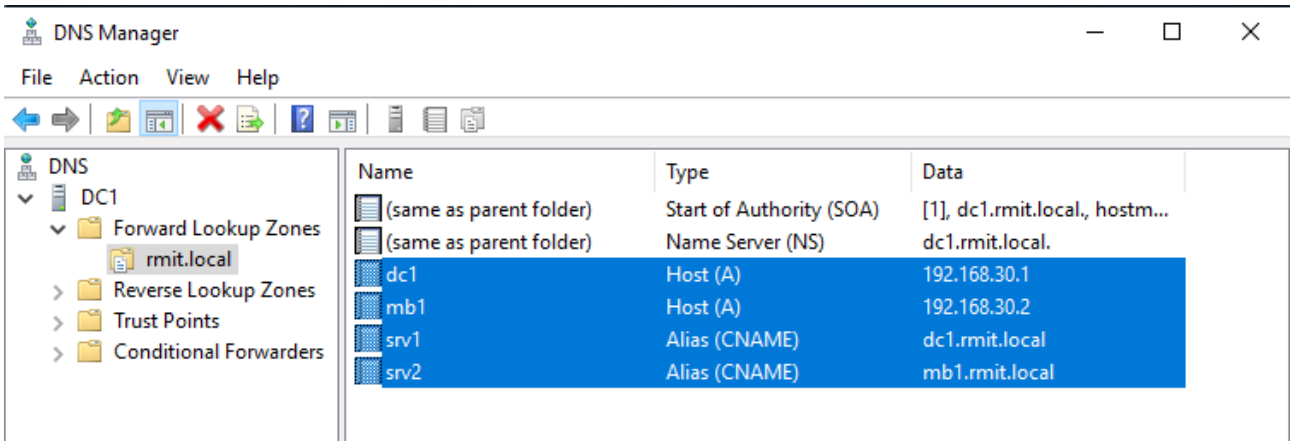


- Right click on rmit.local.
- Click **New Alias (CNAME)**.
- Type in the following before clicking **OK**.
- Click **Finish**. The zone is created.

Now that the zone is created, I will create the PTR records.



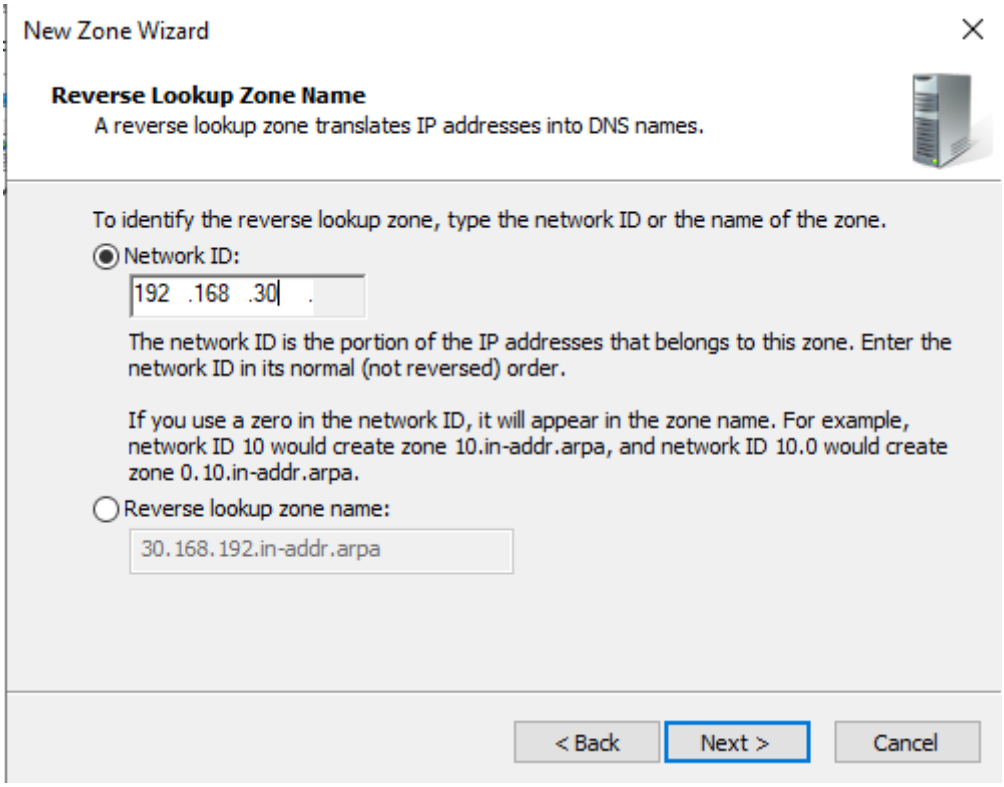
So thus far, this is what you have in the Primary Forward Lookup Zone.



I am going to create Reverse Lookup Zones. Reverse Lookup Zones aren't mandatory however what they do is resolve IP addresses to host names, they act opposite to Host Records. These records I will create are called Pointer (PTR) records.

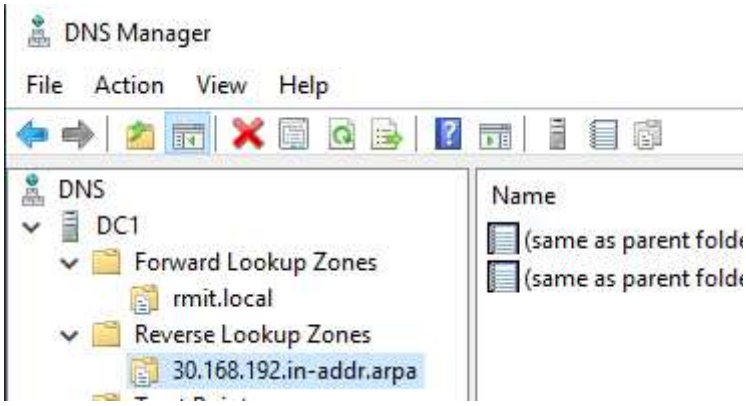
- Double click **Reverse Lookup Zones**.

- Right click on Reverse Lookup Zones and select **New Zone**.
- Click **Next**.
- Select **Primary Zone** and click **Next**.
- Select **IPv4 Reverse Lookup Zone**, click **Next**.
- Type in the following before clicking **Next**.

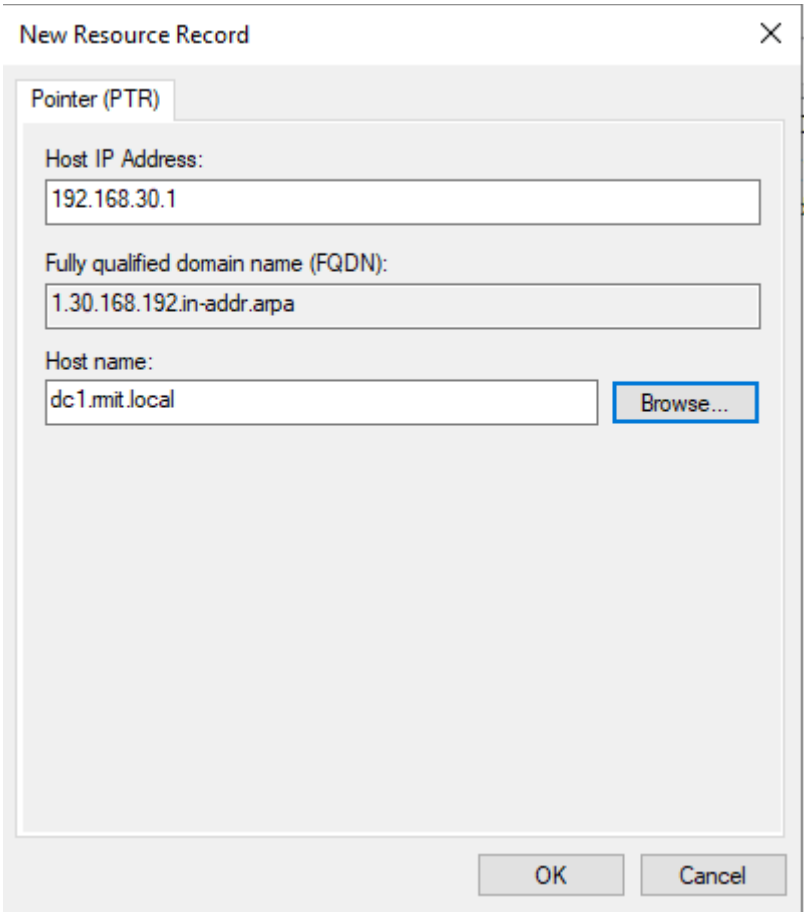


- Change nothing for zone file, click **Next**.
- **Do now allow dynamic updates**, click **Next**.
- Click **Finish**.

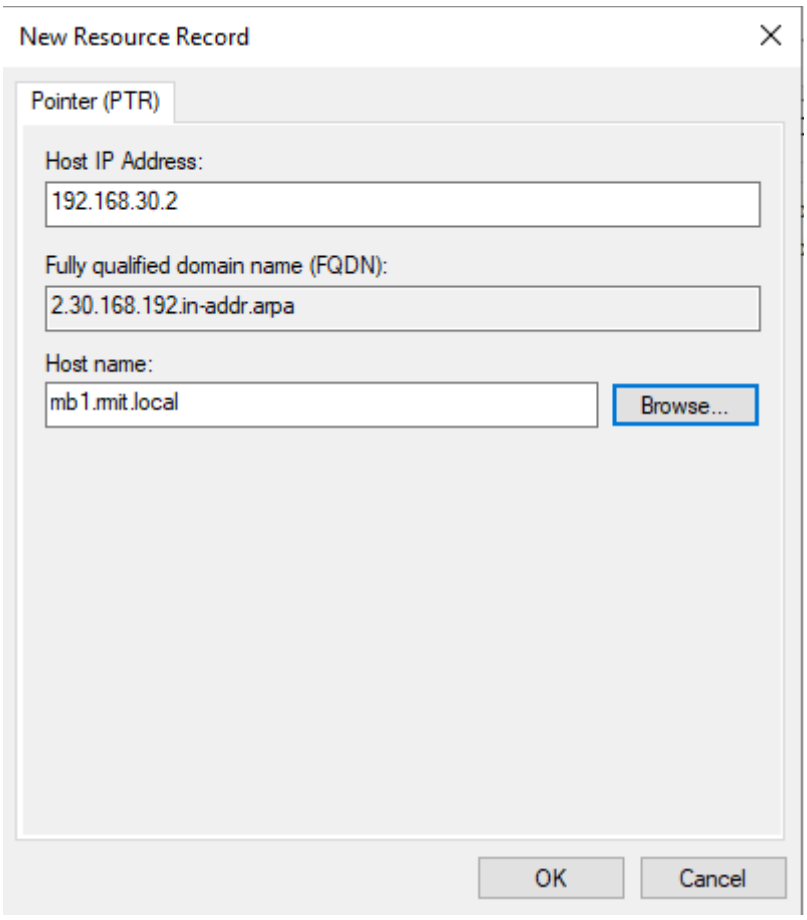
Now that the Reverse Lookup Zone has been created, double click on it.



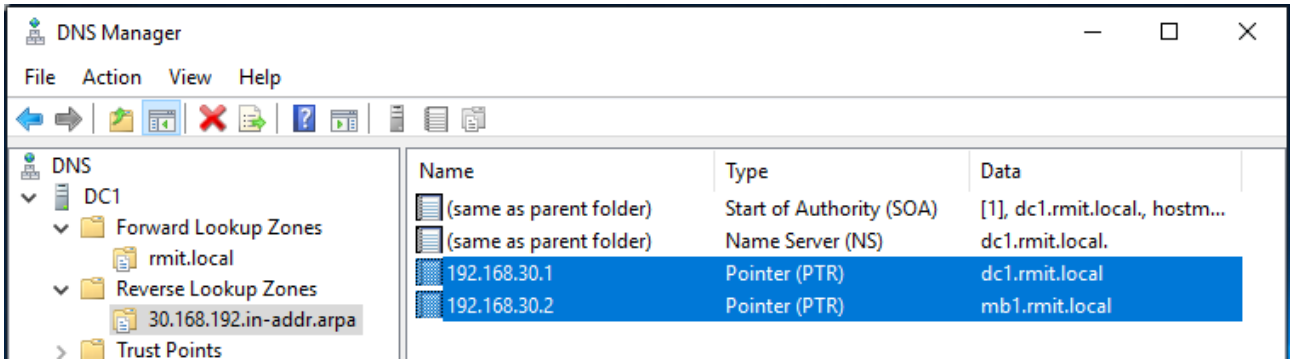
- Right click on the reverse lookup zone you created. Click **New Pointer (PTR)**.
- Enter the following details before clicking **OK**.



- Right click on the reverse lookup zone you created. Click **New Pointer (PTR)**.
- Enter the following details before clicking **OK**.



- Verify the two pointer records have been created.



NSLOOKUP

Nslookup is a command that is used to test your DNS Server works. It is used to test for Forward Lookups and Reverse Lookups. To access Nslookup, you need to access the Command Prompt.

In the screenshots below:

- The server command in NSLOOKUP tells it which DNS server you want to perform the tests

upon.

- **Default Server** and **Address** tells you the DNS Server doing the tests.
- **Name** and **Address** tells you the answer to your query for host records.
- Set command indicates which type of record you want to test for, CNAME for Alias Records, PTR for pointer records and A for Host Records.
- Srv1.rmit.local canonical name = dc1.rmit.local says that srv1.rmit.local is dc1.rmit.local but represented as a second name.
- 1.30.168.192.in-addr.arpa name = dc1.rmit.local means 192.168.30.1 represents dc1.rmit.local, a reverse lookup.
- Exit command to terminate NSLOOKUP.

- On DC1, click the Windows button, type **cmd** and click **Command Prompt**.
- Type the following commands that are highlighted and verify the output is correct which is shown after the commands.

Nslookup

server dc1.rmit.local.

```
C:\Users\Administrator>nslookup
Default Server:  localhost
Address:  127.0.0.1

> server dc1.rmit.local.
Default Server:  dc1.rmit.local
Address:  192.168.30.1
```

Dc1.rmit.local.

```
> dc1.rmit.local.
Server:  dc1.rmit.local
Address:  192.168.30.1

Name:    dc1.rmit.local
Address:  192.168.30.1
```

Mb1.rmit.local.

```
> mb1.rmit.local.
Server:  dc1.rmit.local
Address:  192.168.30.1

Name:    mb1.rmit.local
Address:  192.168.30.2
```

Set type=cname

srv1.rmit.local.

```
> set type=cname
> srv1.rmit.local.
Server:  dc1.rmit.local
Address:  192.168.30.1

srv1.rmit.local canonical name = dc1.rmit.local
>
```

Set type=ptr

192.168.30.1

```
srv1.rmit.local canonical name = dc1.rmit.local
> set type=ptr
> 192.168.30.1
Server:  dc1.rmit.local
Address:  192.168.30.1

1.30.168.192.in-addr.arpa       name = dc1.rmit.local
```

192.168.30.2

```
> 192.168.30.2
Server:  dc1.rmit.local
Address:  192.168.30.1

2.30.168.192.in-addr.arpa       name = mb1.rmit.local
>
```

exit

Exercise 3

Set up the primary zones on DC1. Perform the following:

- Create a forward lookup zone called **zooropa.net**.
- Create two host records, one for DC1 and MB1 inside zooropa.net.
- Create two alias records, Server1 for DC1 and Server2 for MB1 in zooropa.net.
- Create two pointer records for DC1 and MB1 that points to the host records in zooropa.net.
- Open Command Prompt, run nslookup.
- Test to see that you can perform a forward lookup on the host records.
- Test to see that you can perform a forward lookup on the alias records.
- Test to see that you can perform a reverse lookup on the pointer records.

DNS Secondary Zones

It is a read-only copy of the Primary Zone stored on another server. The Secondary Zone is stored on another separate folder. It helps in load balancing so that if the Primary DNS Server is busy performing lookups, the secondary DNS Server takes over to solve the lookups.

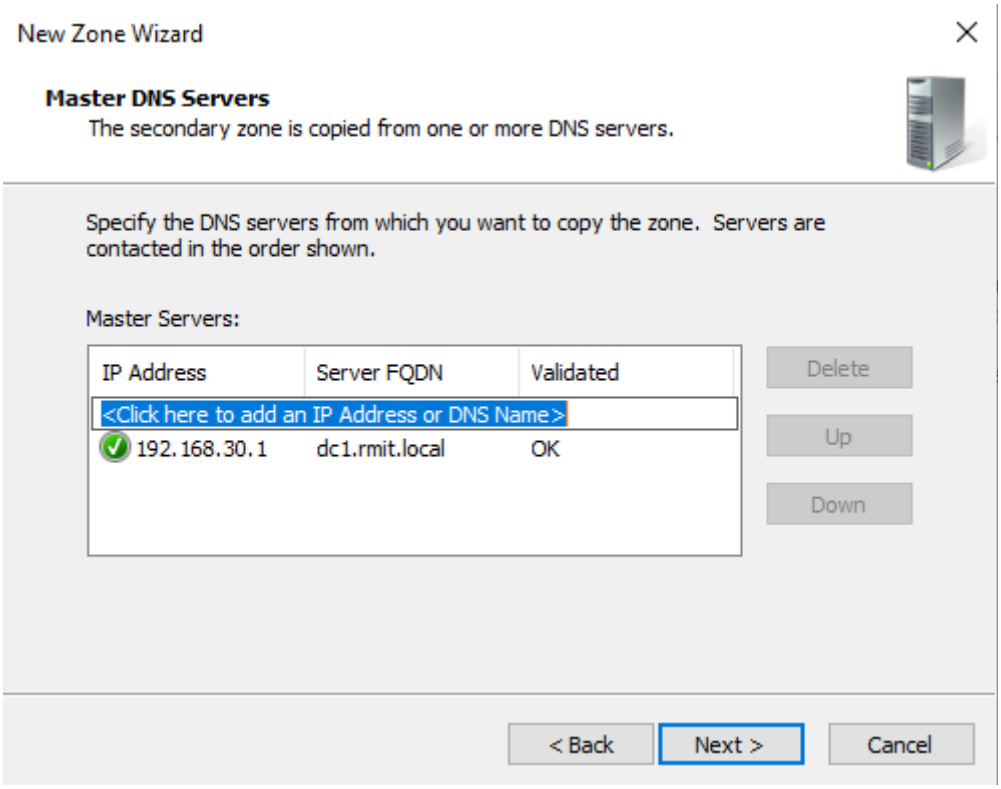
The Primary DNS Server always contains the Primary Zone. Primary Zones can be edited.

The Secondary DNS Server always contains the Secondary Zone. Secondary Zones cannot be edited.

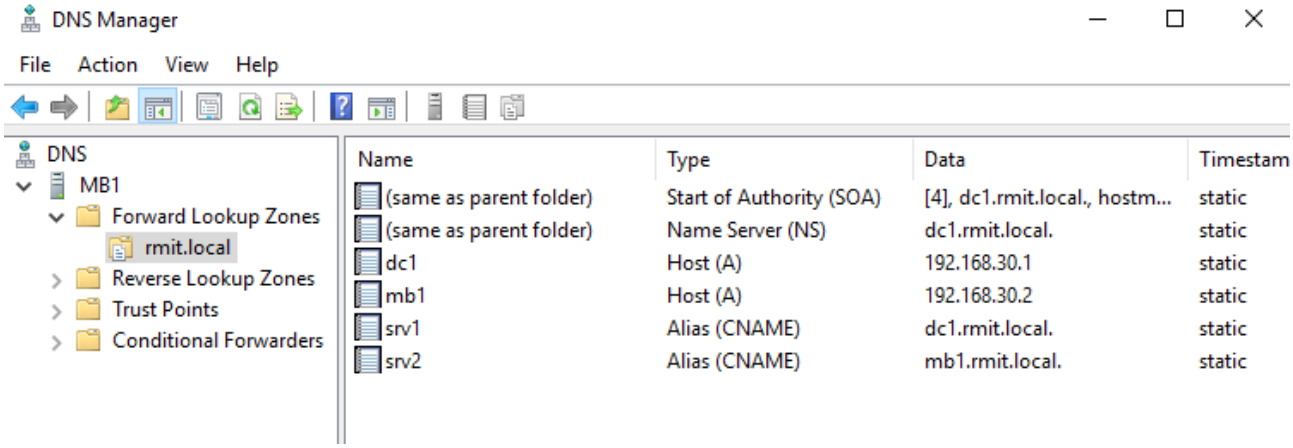
It is possible to convert a Secondary Zone to a Primary Zone.

- On MB1, click **Tools** > **DNS** in Server Manager.
- Double click **MB1** and then double click **Forward Lookup Zones**.
- Right click on Forward Lookup Zones and select **New Zone**.
- Click **Next**.
- Select **Secondary Zone**. Click **Next**.
- For Zone name, type **rmit.local**, then click **Next**.
- Enter the IP address of the Master DNS Server or Primary DNS Server containing the Primary Zone. 192.168.30.1. Click somewhere in the whitespace and verify the following

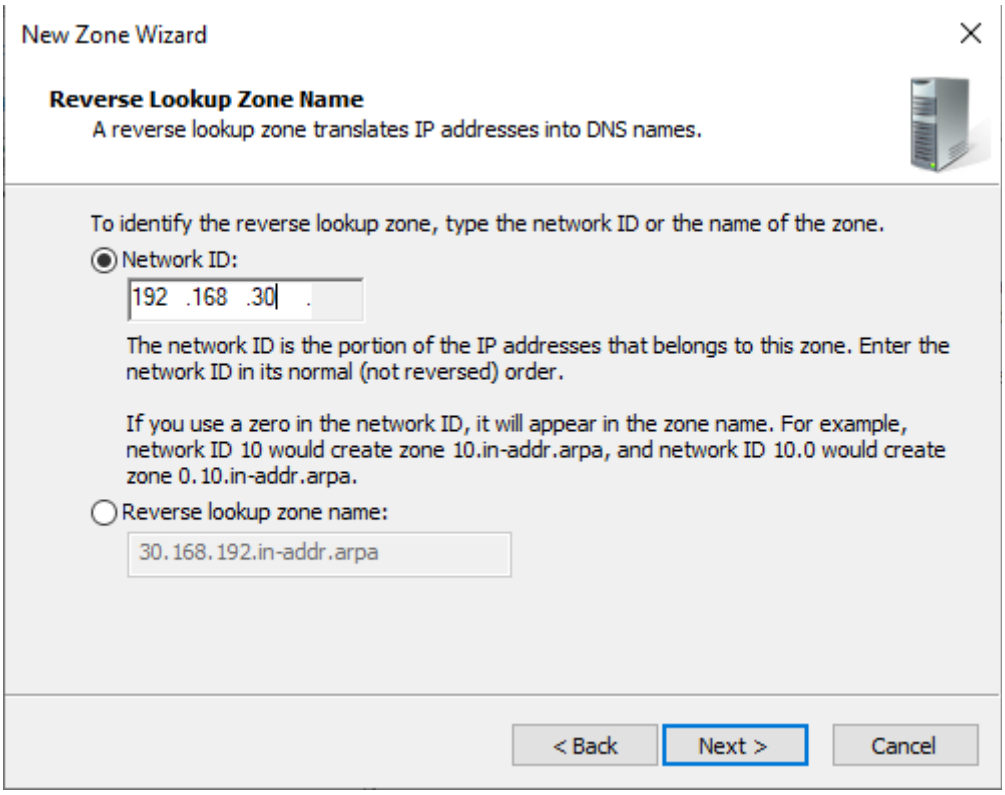
before clicking **Next**.



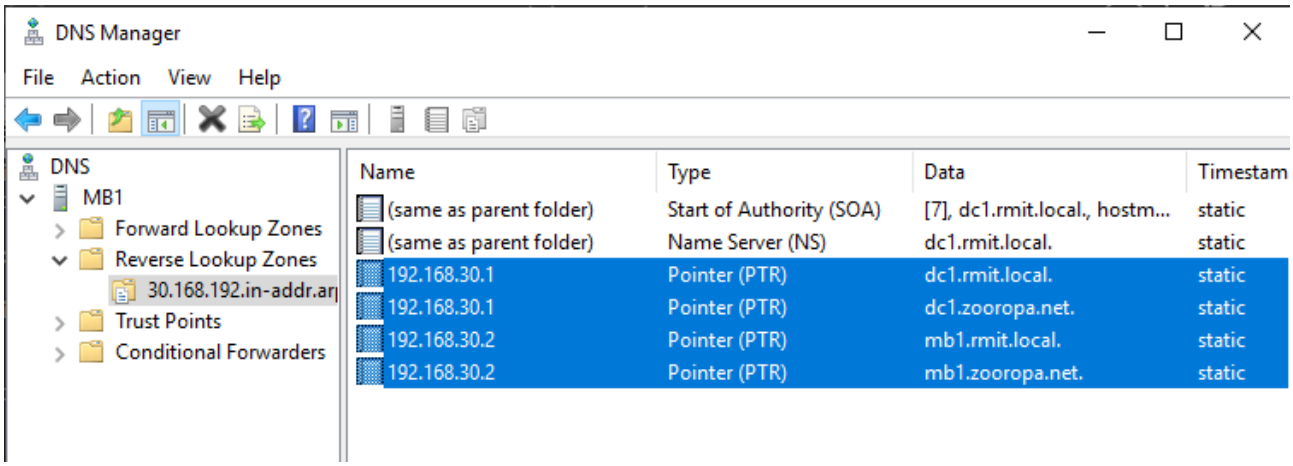
- Click **Finish**.
- Double click **rmit.local**. If you see **Zone not loaded by DNS Server**, I need to do something on the Primary DNS Server.
- DC1 is the Primary DNS Server, locate **rmit.local**. Right click rmit.local and select **Properties**.
- Select the **Zone Tranfers** tab.
- Tick **Allow zone transfers** and choose **To any server**, then click **OK**.
- Switch back to MB1, click on **rmit.local**. Press the **F5** key and the transfer should occur.



- On MB1, click **Tools** > **DNS** in Server Manager.
- Double click **MB1** and then double click **Reverse Lookup Zones**.
- Right click on Forward Lookup Zones and select **New Zone**.
- Click **Next**.
- Select **Secondary Zone**. Click **Next**.
- For Zone name, type **IPv4 Reverse Lookup Zone**, then click **Next**.
- Type in the following information before clicking **Next**.

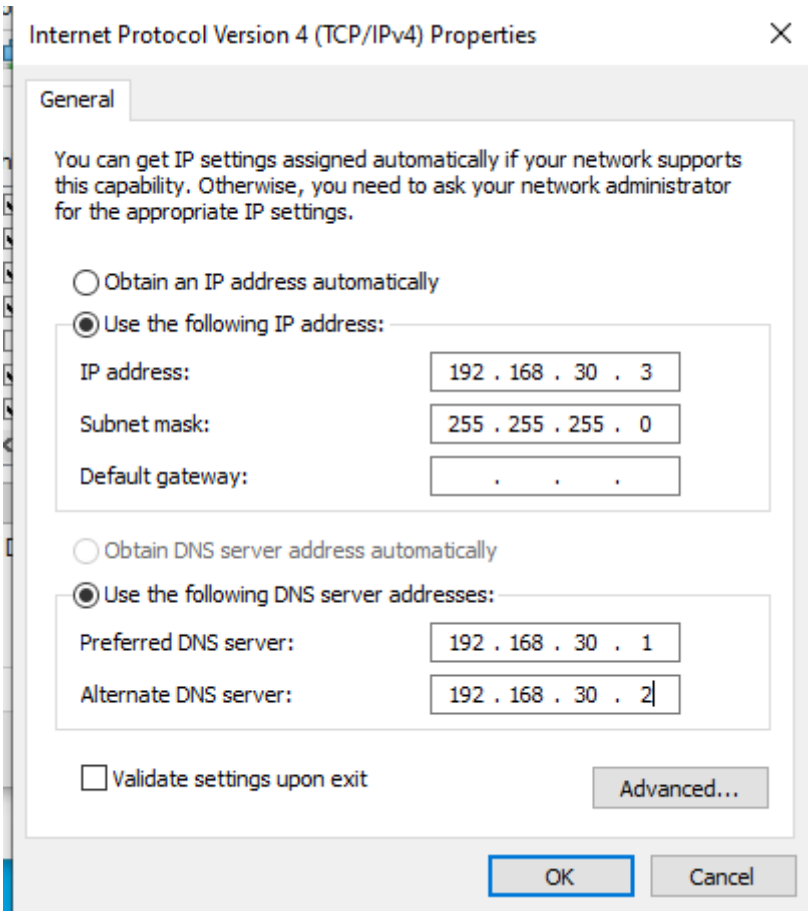


- Enter the IP address of the Master DNS Server or Primary DNS Server containing the Primary Zone. 192.168.30.1. Click somewhere in the whitespace and verify the following before clicking **Next**.
- Click **Finish**.
- Double click **30.168.192.in-addr.arpa**. If you see **Zone not loaded by DNS Server**, I need to do something on the Primary DNS Server.
- DC1 is the Primary DNS Server, locate **rmit.local**. Right click 30.168.192.in-addr.arpa and select **Properties**.
- Select the **Zone Tranfers** tab.
- Tick **Allow zone transfers** and choose **To any server**, then click **OK**.
- Switch back to MB1, click on **30.168.192.in-addr.arpa**. Press the **F5** key and the transfer should occur.



Now I am going to start up Workstation to see how to tell it about both Primary and Secondary DNS Servers it needs to contact.

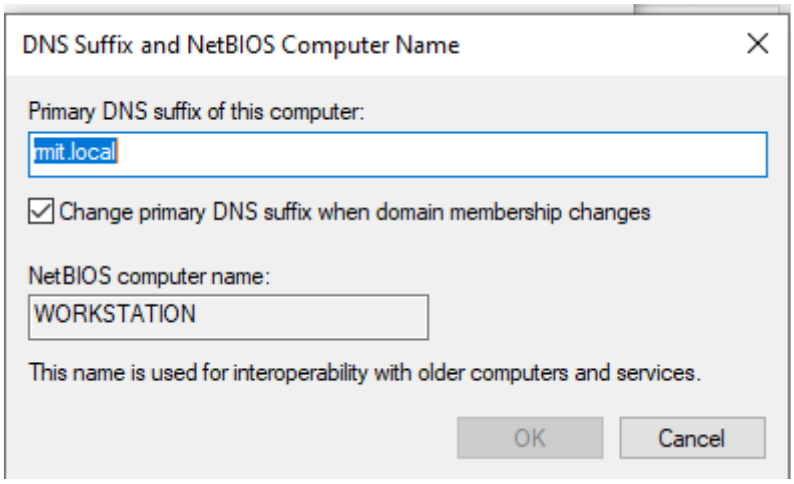
- Right click the Windows button and select **Run**.
- Type **ncpa.cpl** and click **OK**.
- Right click on Ethernet Connection and select **Properties**.
- Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.
- Enter the following details in the screenshot before clicking **OK**.



- Click **Close**.

The next thing to do is change the computer name.

- Right click the Windows button and select **System**.
- Scroll down until you see **System Info**. Click it.
- Click **Change settings**.
- Click **Change**.
- For Computer Name, type **Workstation**.
- Click the **More** button.
- Enter the following details before clicking **OK**.



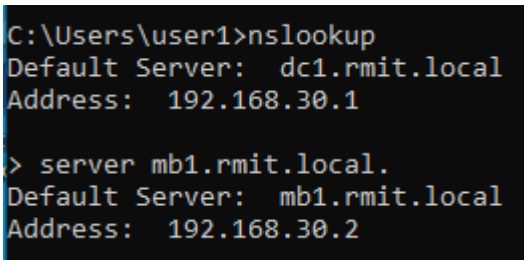
- Click **OK**. Click **OK** to restart computer.
- Click **Close**.
- Click **Restart Now** to restart the virtual machine.

Now I use NSLOOKUP to see if it can use the Secondary DNS Server to resolve forward lookups and reverse lookups.

- On Workstation, click the Windows button, type **cmd** and open up Command Prompt.
- Type the following commands highlighted, the screenshots will shows you the results you will get.

Nslookup

server mb1.rmit.local.



Dc1.rmit.local.

```
> dc1.rmit.local.
Server:  mb1.rmit.local
Address:  192.168.30.2

Name:    dc1.rmit.local
Address:  192.168.30.1
```

Mb1.rmit.local.

```
> mb1.rmit.local.
Server:  mb1.rmit.local
Address:  192.168.30.2

Name:    mb1.rmit.local
Address:  192.168.30.2
```

Set type=cname

srv1.rmit.local.

```
> set type=cname
> srv1.rmit.local.
Server:  mb1.rmit.local
Address:  192.168.30.2

srv1.rmit.local canonical name = dc1.rmit.local
```

Srv2.rmit.local.

```
> srv2.rmit.local.
Server:  mb1.rmit.local
Address:  192.168.30.2

srv2.rmit.local canonical name = mb1.rmit.local
```

Set type=ptr

192.168.30.1

```
> set type=ptr
> 192.168.30.1
Server:  mb1.rmit.local
Address:  192.168.30.2

1.30.168.192.in-addr.arpa       name = dc1.rmit.local
```

192.168.30.2

```
> 192.168.30.2
Server:  mb1.rmit.local
Address:  192.168.30.2

2.30.168.192.in-addr.arpa       name = mb1.rmit.local
```

exit

Exercise 4

- In the primary zone of rmit.local, create a host record called **workstation** then check to see if it is replicated to the secondary zone.
- In the primary zone of 30.168.192.in-addr.arpa, create a pointer record for **workstation** then check to see if it is replicated to the secondary zone.

Exercise 5

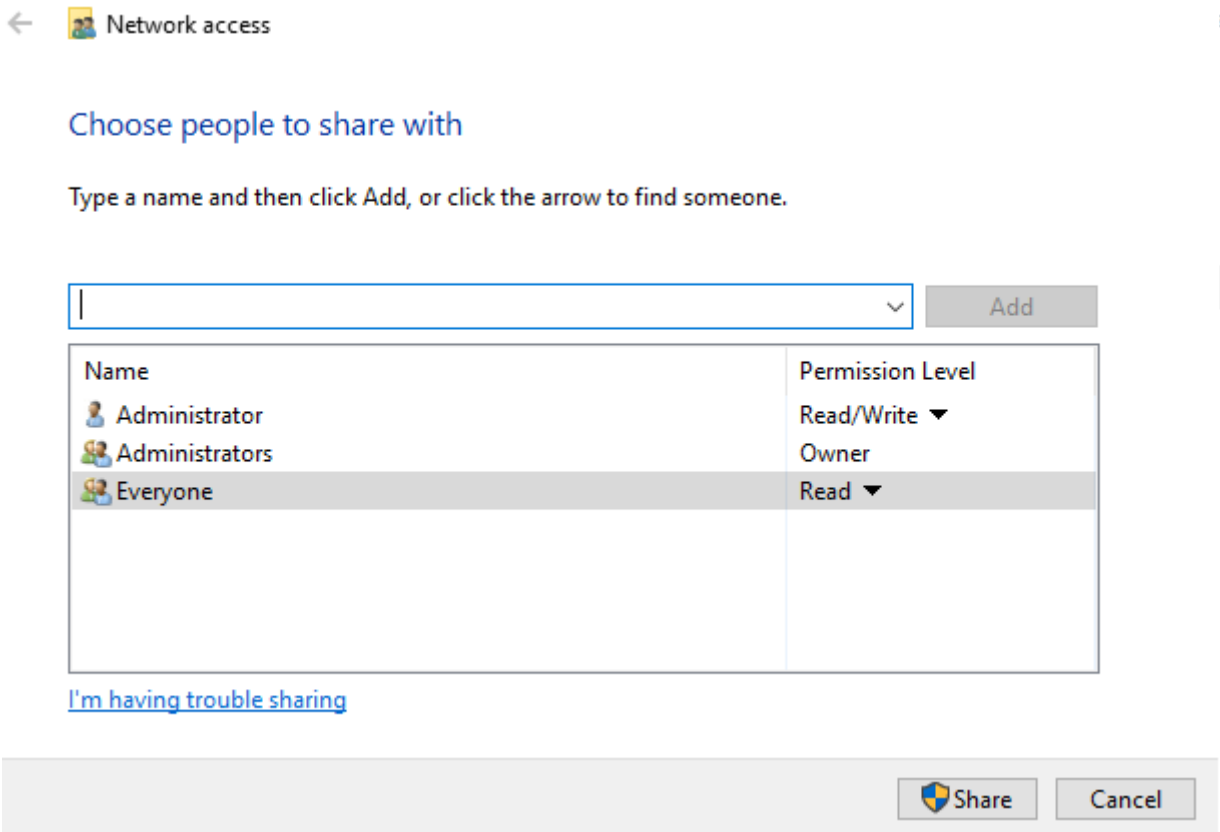
- Have the zooropa.net primary zone on DC1 replicated to the secondary zone on MB1.
- In the primary zone of zooropa.net, create a host record called **workstation** then check to see if it is replicated to the secondary zone.
- In the primary zone of 30.168.192.in-addr.arpa, create a pointer record for **workstation** then check to see if it is replicated to the secondary zone.
- Use nslookup to test that you can contact the Secondary DNS Server and resolve the Host, Alias and Pointer records.

Application of DNS

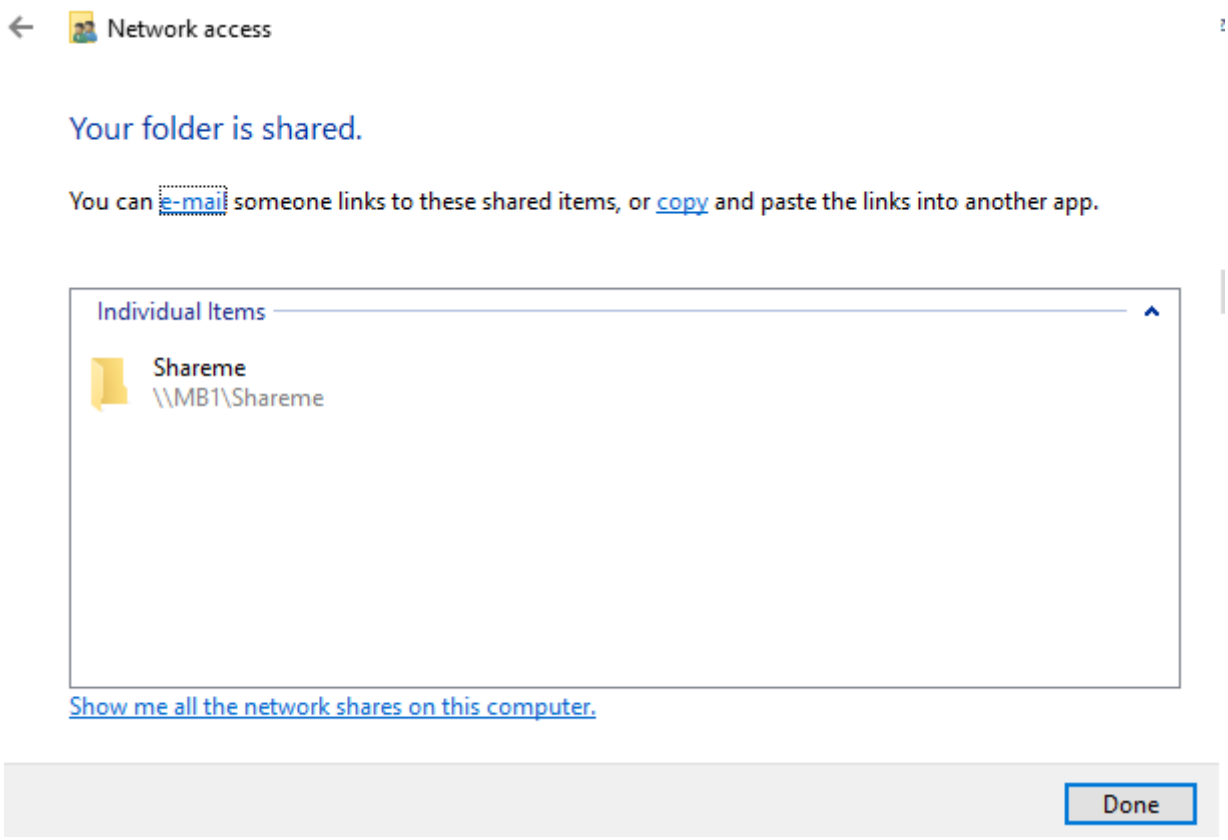
DNS can be applied by trying to access a Network Resource over the network.

If MB1 is going to be a file server, I shall share a folder.

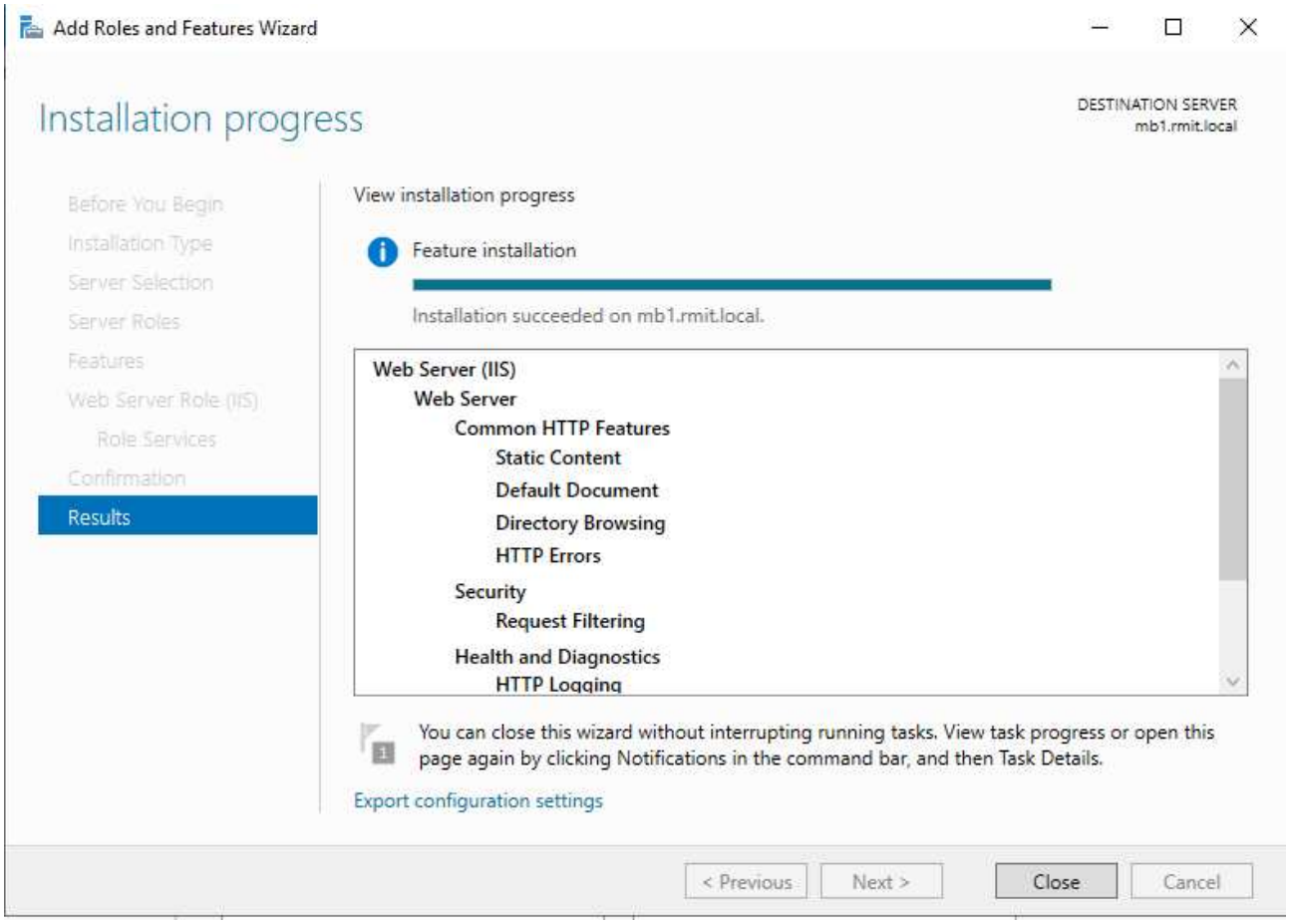
- Open up File Explorer on MB1.
- Click **This PC**.
- Double click **C:**.
- Right click in the white space and select **New > Folder**.
- Type **Shareme** and press Enter.
- Right click on **Shareme** and select **Give Access To > Specific people**.
- Type **Everyone** and click **Add** as shown below. Then click **Share**.



- Click **Yes, turn on network discovery and file sharing for all public networks**.
- You should see the folder being shared. Click **Done**.

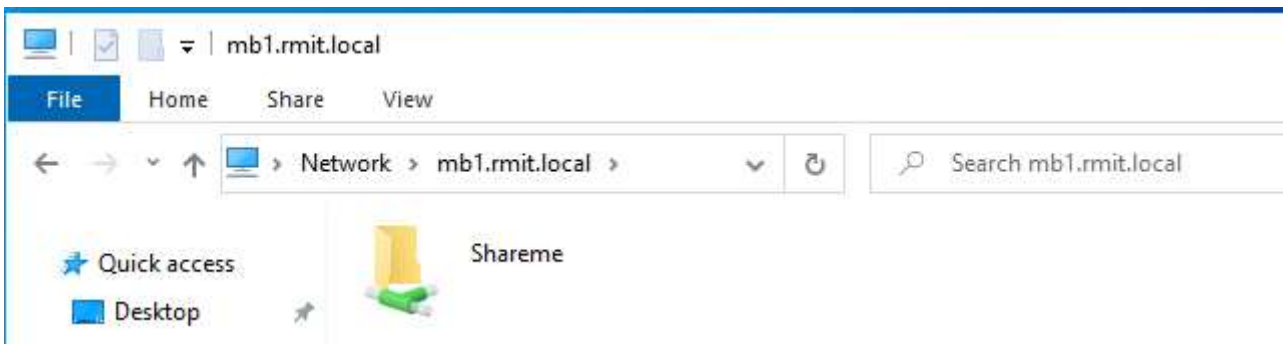


- Open up Server Manager.
- Go to Dashboard. Click **Add Roles and Features**.
- Click **Next**.
- Select **Role-based or Feature-based installation**, click **Next**.
- Select the server name and click **Next**.
- Tick **Web Server (IIS)**, if another window pops up, click **Add Features** to add in the management tools to configure IIS. Click **Next**.
- For Features, nothing needs to be installed, click **Next**.
- Read what Web Server IIS does and click **Next**.
- Do nothing for Roles Services and click **Next**.
- Click **Install** to install IIS on the virtual computer.
- Click **Close** once installed.

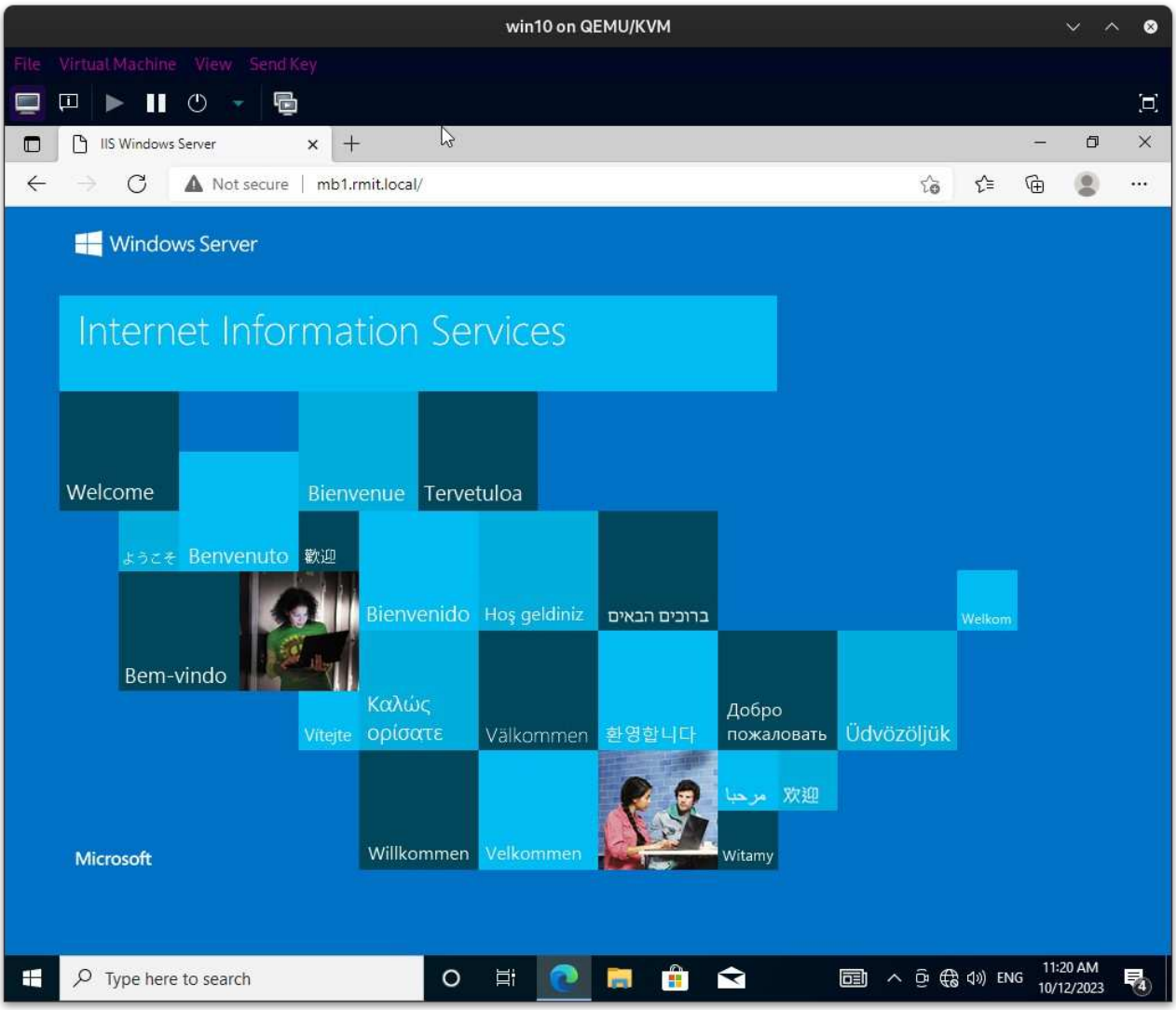


To apply DNS is working, open up Workstation.

- Open up **File Explorer**.
- Type **mb1.rmit.local** and press Enter.
- You are asked to authenticate, type in **administrator** and the password of the server MB1. Click **OK**.
- You see the folder **Shareme**, if you double click it, you can access it.



- Open up Microsoft Edge in Workstation.
- Type in **http://mb1.rmit.local** and press Enter. You should access the web page.



Exercise 6

- On Workstation, can you access the shared folder using the UNC name **srv2.rmit.local**.
- On Workstation, can you access the web site by using URL of http://srv2.rmit.local.