## DNS

DNS, or Domain Name System, is a fundamental component of the internet that translates humanreadable 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 <u>www.example.com</u>, 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**.

Internet Protocol Version 4 (TCP/IPv4)	Properties X
General	
You can get IP settings assigned auton this capability. Otherwise, you need to for the appropriate IP settings.	natically if your network supports ask your network administrator
Obtain an IP address automatical	у
• Use the following IP address:	
IP address:	192.168.30.1
Subnet mask:	255.255.255.0
Default gateway:	
Obtain DNS server address autom	natically
• Use the following DNS server add	resses:
Preferred DNS server:	127.0.0.1
Alternate DNS server:	
Validate settings upon exit	Advanced
	OK Cancel

• 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**.

DNS Suffix and NetBIOS Computer Name	×
Primary DNS suffix of this computer: mit.local	
Change primary DNS suffix when domain membership changes	
NetBIOS computer name: DC1 This name is used for interoperability with older computers and services.	
OK Cancel	

- 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:

🚡 Server Manager

Server Manager • Local Server			
Dashboard	PROPERTIES For DC1		
Local Server	Computer name	DC1	
All Servers	Workgroup	WORKGROUP	
	Windows Defender Firewall	Public: On	
	Remote management	Enabled	
	Remote Desktop	Disabled	
	NIC Teaming	Disabled	
	Ethernet Instance 0	192.168.30.1, IPv6 enabled	

## **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.

Add Roles and Features Wiza	ress	DESTINA		/ER
Before You Begin Installation Type Server Selection Server Roles Features DNS Server Confirmation	View installation progress		DC1.rmit.lo	
Results	You can close this wizard without interrupting running tasks. View task propage again by clicking Notifications in the command bar, and then Task De Export configuration settings	ogress or o etails.	open this	
	< Previous Next > Cla	ose	Cance	9

• 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**.

é F	New Zone Wizard X
	Zone Name What is the name of the new zone?
	The zone name specifies the portion of the DNS namespace for which this server is authoritative. It might be your organization's domain name (for example, microsoft.com) or a portion of the domain name (for example, newzone.microsoft.com). The zone name is not the name of the DNS server.
	Zone name: rmit.local
	< Back Next > Cancel

- 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.

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<ul> <li>DNS</li> <li>DC1</li> <li>Forward Lookup Zones</li> <li>rmit.local</li> <li>Reverse Lookup Zones</li> </ul>	Name (same as parent folder) (same as parent folder) dc1	Type Start of Authority (SOA) Name Server (NS) Host (A)	Data [1], dc1.rmit.local., hostm dc1.rmit.local. 192.168.30.1	

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

New Host		×
Name (uses parent domain name	if blank):	
mb 1		
Fully qualified domain name (FQD	N):	
mb1.rmit.local.		
IP address:		
192.168.30.2		
Create associated pointer (PT	R) record	
	Add Host	Cancel

• 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**.

New Resource Record	$\times$
Alias (CNAME)	
Alias name (uses parent domain if left blank): srv 1	]
Fully qualified domain name (FQDN):	-
srv1.mit.local.	
Fully qualified domain name (FQDN) for target host:	
dc1.mit.local Browse	
OK Cancel	

- 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.

New Resource Record	×
Alias (CNAME)	
Alias name (uses parent domain if left blank):	
srv2	
Fully qualified domain name (FQDN):	
srv2.mit.local.	
Fully qualified domain name (FQDN) for target host:	
mb1.mit.local	Browse
OK	Canaal
OK	Cancel

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

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<ul> <li>DNS</li> <li>DC1</li> <li>Forward Lookup Zones</li> <li>rmit.local</li> <li>Reverse Lookup Zones</li> <li>Trust Points</li> <li>Conditional Forwarders</li> </ul>	Name (same as parent folder) (same as parent folder) dc1 mb1 srv1 srv2	Type Start of Authority (SOA) Name Server (NS) Host (A) Host (A) Alias (CNAME) Alias (CNAME)	Data [1], dc1.rmit.local., hostm dc1.rmit.local. 192.168.30.1 192.168.30.2 dc1.rmit.local mb1.rmit.local	

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**.

New Zone Wizard	×
Reverse Lookup Zone Name A reverse lookup zone translates IP addresses into DNS names.	
To identify the reverse lookup zone, type the network ID or the nam   Network ID:  192 .168 .30  The network ID is the portion of the IP addresses that belongs to network ID in its normal (not reversed) order.  If you use a zero in the network ID, it will appear in the zone nam network ID 10 would create zone 10.in-addr.arpa, and network I zone 0.10.in-addr.arpa.	e of the zone. o this zone. Enter the ne. For example, D 10.0 would create
Reverse lookup zone name:	
< Back Next	> Cancel

- 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**.

New Resource Record	$\times$
Pointer (PTR)	
Host IP Address:	
Fully qualified domain name (FODN):	
1.30.168.192.in-addr.arpa	
Host name:	
dc1.mit.local Browse	
OK Cance	; <b> </b>

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

New Resource Record	×
Pointer (PTR)	
Host IP Address: 192.168.30.2	
Fully qualified domain name (FQDN):	
2.30.168.192.in-addr.arpa	
Host name:	
mb1.mit.local Browse	
OK Can	cel

• 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.rm	it.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



#### 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.

New Zo Mas	New Zone Wizard     X       Master DNS Servers     Image: Comparison of the secondary zone is copied from one or more DNS servers.			
s c	Specify the DNS serve contacted in the order Master Servers:	rs from which you wa shown.	nt to copy the zone. Ser	vers are
[	IP Address	Server FQDN	Validated	Delete
	Click here to add ar 192.168.30.1	IP Address or DNS N dc1.rmit.local	lame> OK	Up Down
			< Back Next	> Cancel

- 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.

#### 🛔 DNS Manager

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🗢 🏟 🗖 💼 🖬 🖬	⇔ ⇒   2 📅   🛱 🖻 🗟 🖬   🛛 🖬   🗄 🛱					
<ul> <li>DNS</li> <li>MB1</li> <li>Forward Lookup Zones</li> <li>rmit.local</li> <li>Reverse Lookup Zones</li> <li>Trust Points</li> <li>Conditional Forwarders</li> </ul>	Name (same as parent folder) (same as parent folder) dc1 mb1 srv1 srv2	Type Start of Authority (SOA) Name Server (NS) Host (A) Host (A) Alias (CNAME) Alias (CNAME)	Data [4], dc1.rmit.local., hostm dc1.rmit.local. 192.168.30.1 192.168.30.2 dc1.rmit.local. mb1.rmit.local.	Timestam static static static static static static static		

- 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**.

New Zone Wizard	×
Reverse Lookup Zone Name A reverse lookup zone translates IP addresses into DNS names.	
To identify the reverse lookup zone, type the network ID or the nam <ul> <li>Network ID:</li> <li>192 .168 .30</li> <li>The network ID is the portion of the IP addresses that belongs to network ID in its normal (not reversed) order.</li> </ul> If you use a zero in the network ID, it will appear in the zone nar network ID 10 would create zone 10.in-addr.arpa, and network I zone 0, 10.in-addr.arpa.	ne of the zone. To this zone. Enter the me. For example, ID 10.0 would create
Reverse lookup zone name:	
30. 168. 192.in-addr.arpa	> Cancel

- 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.

🎄 DNS Manager			— C	ı ×
File Action View Help				
<ul> <li>DNS</li> <li>MB1</li> <li>Forward Lookup Zones</li> <li>Reverse Lookup Zones</li> <li>30.168.192.in-addr.arj</li> <li>Trust Points</li> <li>Conditional Forwarders</li> </ul>	Name (same as parent folder) (same as parent folder) 192.168.30.1 192.168.30.2 192.168.30.2	Type Start of Authority (SOA) Name Server (NS) Pointer (PTR) Pointer (PTR) Pointer (PTR) Pointer (PTR)	Data [7], dc1.rmit.local., hostm dc1.rmit.local. dc1.rmit.local. dc1.zooropa.net. mb1.rmit.local. mb1.zooropa.net.	Timestam static static static static static static static

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**.

	Internet Protocol Version 4 (TCP/IPv4) Properties			$\times$	
	General				
	You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.				
	Obtain an IP ad	ldress automaticall	у		
	• Use the followin	ig IP address:			
C	IP address:		192 . 168 . 30	).3	
	Subnet mask:		255 . 255 . 25	5.0	
	Default gateway:				
۵	Obtain DNS server address automatically				
l	• Use the followin	ng DNS server add	resses:		
	Preferred DNS ser	ver:	192 . 168 . 30	0.1	
	Alternate DNS ser	ver:	192 . 168 . 30	0.2	
	Validate setting	gs upon exit		Advanced	
			ОК	Cancel	

• 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**.

DNS Suffix and NetBIOS Computer Name		×
Primary DNS suffix of this computer: mit.local		
Change primary DNS suffix when domain men	nbership change	s
NetBIOS computer name:		
WORKSTATION		
This name is used for interoperability with older co	omputers and se	rvices.
	ОК	Cancel

- 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.

<mark>Nslookup</mark>

server mb1.rmit.local.

```
C:\Users\user1>nslookup
Default Server: dc1.rmit.local
Address: 192.168.30.1
> server mb1.rmit.local.
Default Server: mb1.rmit.local
Address: 192.168.30.2
```

Dc1.rmit.local.

> dc1.rm	> dc1.rmit.local.		
Server:	mb1.rmit.local		
Address:	192.168.30.2		
Name: Address:	dc1.rmit.local 192.168.30.1		

## Mb1.rmit.local.

> mb1.rmit.local.		
Server:	mb1.rmit.local	
Address:	192.168.30.2	
Name: Address:	mb1.rmit.local 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			
Se	erver: mb1.rmit.local			
Ac	dress: 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.
- Metwork access

### Choose people to share with

Type a name and then click Add, or click the arrow to find someone.

	✓ Add
Name Administrator	Permission Level Read/Write 🔻
Everyone	Read 🔻
Par having the chains	



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

2



### Your folder is shared.

You can e-mail someone links to these shared items, or copy and paste the links into another app.

Individual Items	^			
Shareme \\MB1\Shareme				
Show me all the network shares on this computer.				

•	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.

7

Done

📥 Add Roles and Features Wizard X DESTINATION SERVER Installation progress mb1.rmit.local View installation progress Feature installation Installation succeeded on mb1.rmit.local. Web Server (IIS) Web Server **Common HTTP Features** Static Content **Default Document** Results **Directory Browsing HTTP Errors** Security **Request Filtering** Health and Diagnostics **HTTP** Logging You can close this wizard without interrupting running tasks. View task progress or open this E page again by clicking Notifications in the command bar, and then Task Details. Export configuration settings Close < Previous Next > Cancel

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.



## Donald Attard

- Open up Microsoft Edge in Workstation.
- Type in <u>http://mb1.rmit.local</u> 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 <u>http://srv2.rmit.local</u>.