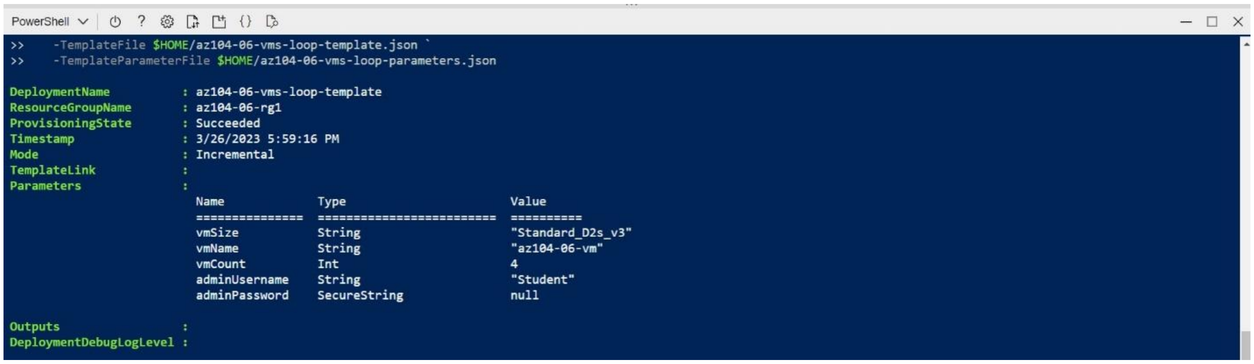
Task 1: Provision the lab environment

In this task, you will deploy four virtual machines into the same Azure region. The first two will reside in a hub virtual network, while each of the remaining two will reside in a separate spoke virtual network

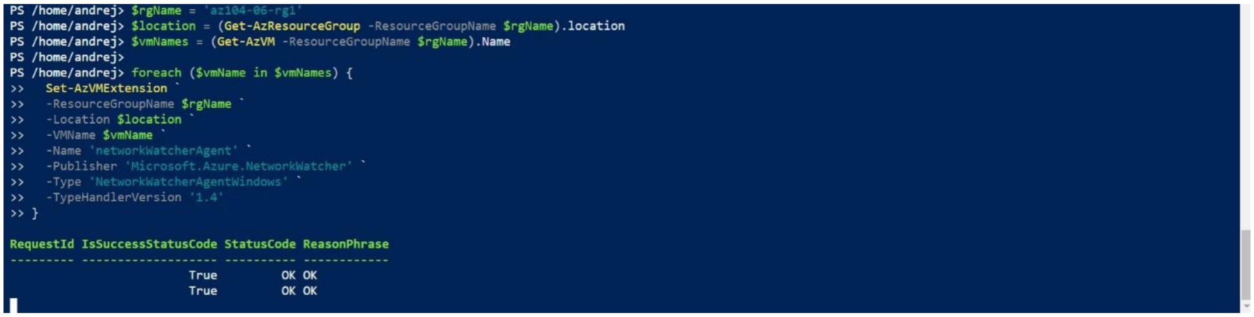


```
>>    -TemplateFile $HOME/az104-06-vms-loop-template.json `
>>    -TemplateParameterFile $HOME/az104-06-vms-loop-parameters.json

DeploymentName          : az104-06-vms-loop-template
ResourceGroupName       : az104-06-rg1
ProvisioningState       : Succeeded
Timestamp               : 3/26/2023 5:59:16 PM
Mode                    : Incremental
TemplateLink            :
Parameters              :
                          Name             Type                       Value
                          ===============  =========================  ==========
                          vmSize           String                     "Standard_D2s_v3"
                          vmName           String                     "az104-06-vm"
                          vmCount          Int                        4
                          adminUsername    String                     "Student"
                          adminPassword    SecureString               null

Outputs                 :
DeploymentDebugLogLevel :
```

From the Cloud Shell pane, run the following to install the Network Watcher extension on the Azure VMs deployed in the previous step:



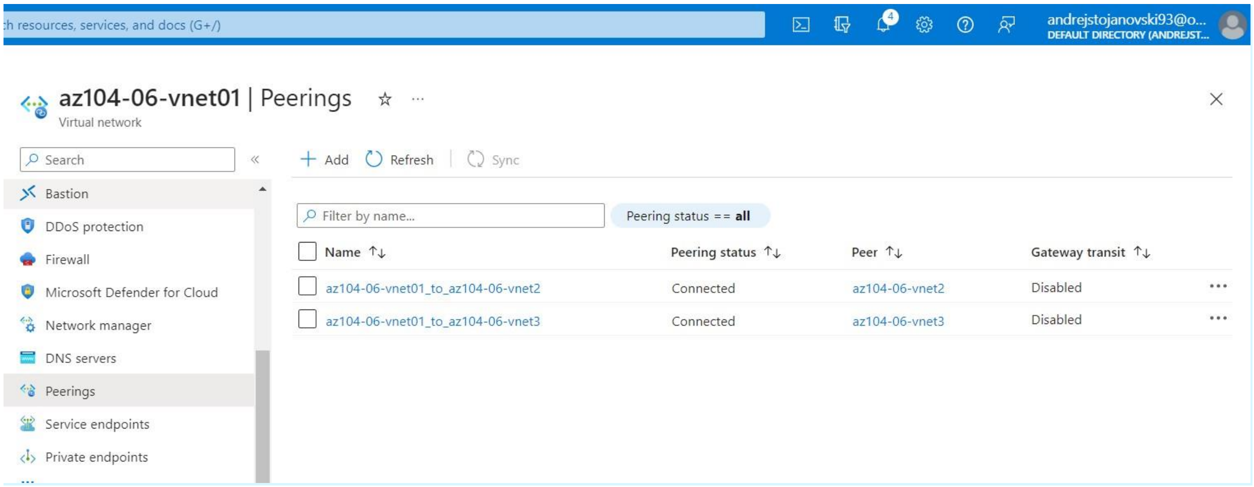
```
PS /home/andrej> $rgName = 'az104-06-rg1'
PS /home/andrej> $location = (Get-AzResourceGroup -ResourceGroupName $rgName).location
PS /home/andrej> $vmNames = (Get-AzVM -ResourceGroupName $rgName).Name
PS /home/andrej>
PS /home/andrej> foreach ($vmName in $vmNames) {
>>   Set-AzVMExtension `
>>   -ResourceGroupName $rgName `
>>   -Location $location `
>>   -VMName $vmName `
>>   -Name 'networkWatcherAgent' `
>>   -Publisher 'Microsoft.Azure.NetworkWatcher' `
>>   -Type 'NetworkWatcherAgentWindows' `
>>   -TypeHandlerVersion '1.4'
>> }

RequestId IsSuccessStatusCode StatusCode ReasonPhrase
--------- ------------------- ---------- ------------
                         True         OK OK
                         True         OK OK
```

Task 2: Configure the hub and spoke network topology

In this task, you will configure local peering between the virtual networks you deployed in the previous tasks in order to create a hub and spoke network topology.

This step establishes two local peerings - one from az104-06-vnet01 to az104-06-vnet2 and the other from az104-06-vnet2 to az104-06-vnet01.



az104-06-vnet01 | Peerings

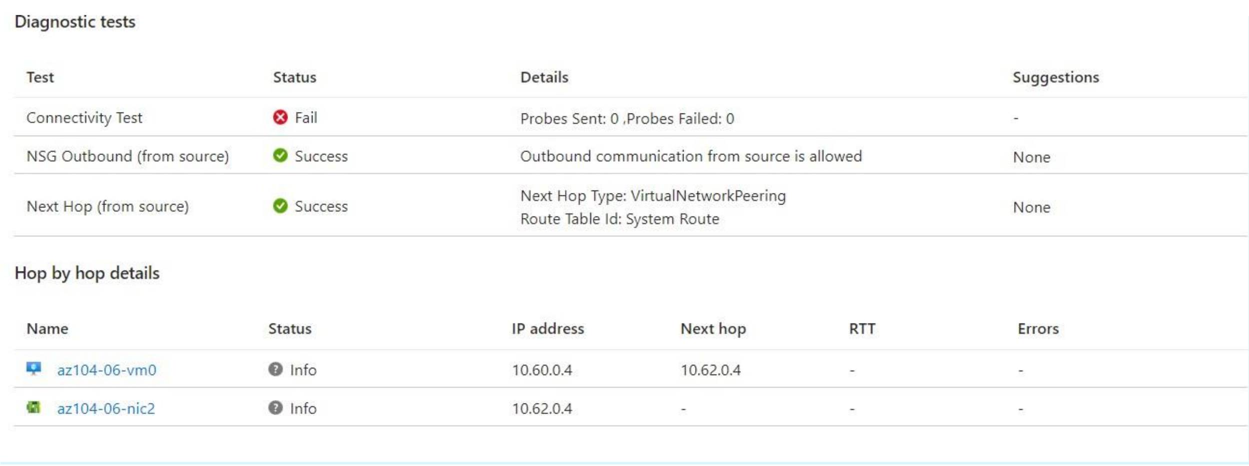
Virtual network

Name	Peering status	Peer	Gateway transit
az104-06-vnet01_to_az104-06-vnet2	Connected	az104-06-vnet2	Disabled
az104-06-vnet01_to_az104-06-vnet3	Connected	az104-06-vnet3	Disabled

Task 3: Test transitivity of virtual network peering

In this task, you will test transitivity of virtual network peering by using Network Watcher.

Note: **10.62.0.4** represents the private IP address of **az104-06-vm2**



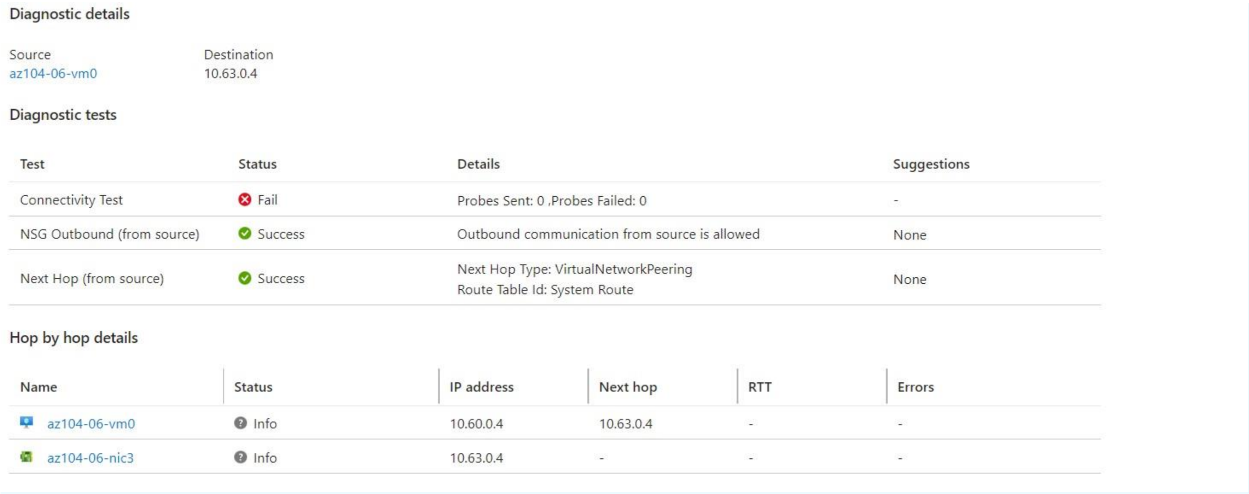
Diagnostic tests

Test	Status	Details	Suggestions
Connectivity Test	✗ Fail	Probes Sent: 0 ,Probes Failed: 0	-
NSG Outbound (from source)	✓ Success	Outbound communication from source is allowed	None
Next Hop (from source)	✓ Success	Next Hop Type: VirtualNetworkPeering Route Table Id: System Route	None

Hop by hop details

Name	Status	IP address	Next hop	RTT	Errors
az104-06-vm0	Info	10.60.0.4	10.62.0.4	-	-
az104-06-nic2	Info	10.62.0.4	-	-	-

10.63.0.4 represents the private IP address of **az104-06-vm3**



Diagnostic details

Source
az104-06-vm0

Destination
10.63.0.4

Diagnostic tests

Test	Status	Details	Suggestions
Connectivity Test	✗ Fail	Probes Sent: 0 ,Probes Failed: 0	-
NSG Outbound (from source)	✓ Success	Outbound communication from source is allowed	None
Next Hop (from source)	✓ Success	Next Hop Type: VirtualNetworkPeering Route Table Id: System Route	None

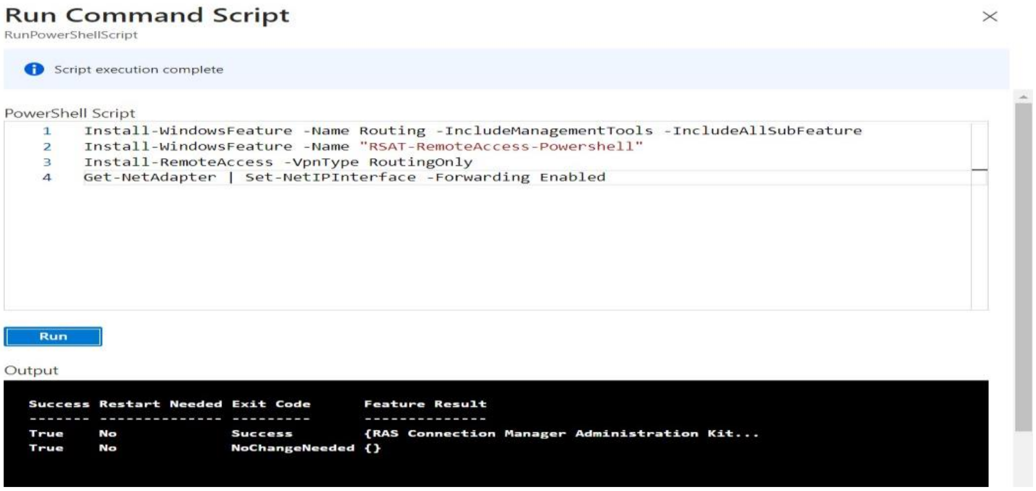
Hop by hop details

Name	Status	IP address	Next hop	RTT	Errors
az104-06-vm0	Info	10.60.0.4	10.63.0.4	-	-
az104-06-nic3	Info	10.63.0.4	-	-	-

Task 4: Configure routing in the hub and spoke topology

In this task, you will configure and test routing between the two spoke virtual networks by enabling IP forwarding on the network interface of the **az104-06-vm0** virtual machine, enabling routing within its operating system, and configuring user-defined routes on the spoke virtual network.

1. On the **az104-06-vm0** blade, in the **Operations** section, click **Run command**, and, in the list of commands, click **RunPowerShellScript**.



Run Command Script
RunPowerShellScript

Script execution complete

PowerShell Script

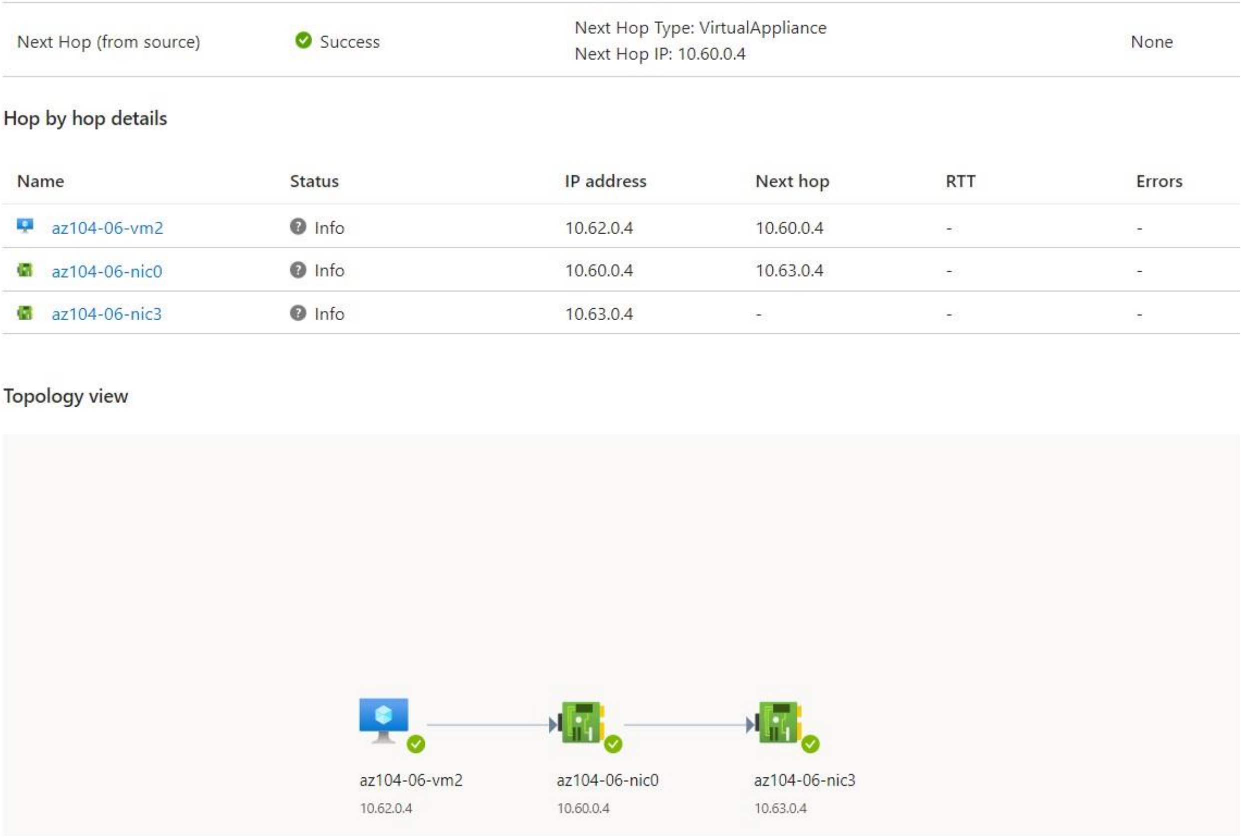
```
Install-WindowsFeature -Name Routing -IncludeManagementTools -IncludeAllSubFeature
Install-WindowsFeature -Name "RSAT-RemoteAccess-Powershell"
Install-RemoteAccess -VpnType RoutingOnly
Get-NetAdapter | Set-NetIPInterface -Forwarding Enabled
```

Output

```
Success Restart Needed Exit Code      Feature Result
------- -------------- ---------      --------------
True    No             Success        {RAS Connection Manager Administration Kit...
True    No             NoChangeNeeded {}
```

1. In the Azure portal, search and select **Route tables** and, on the **Route tables** blade, click **+ Create**.

   On the **Network Watcher - Connection troubleshoot** blade, initiate a check



Next Hop (from source)	✓ Success	Next Hop Type: VirtualAppliance Next Hop IP: 10.60.0.4	None

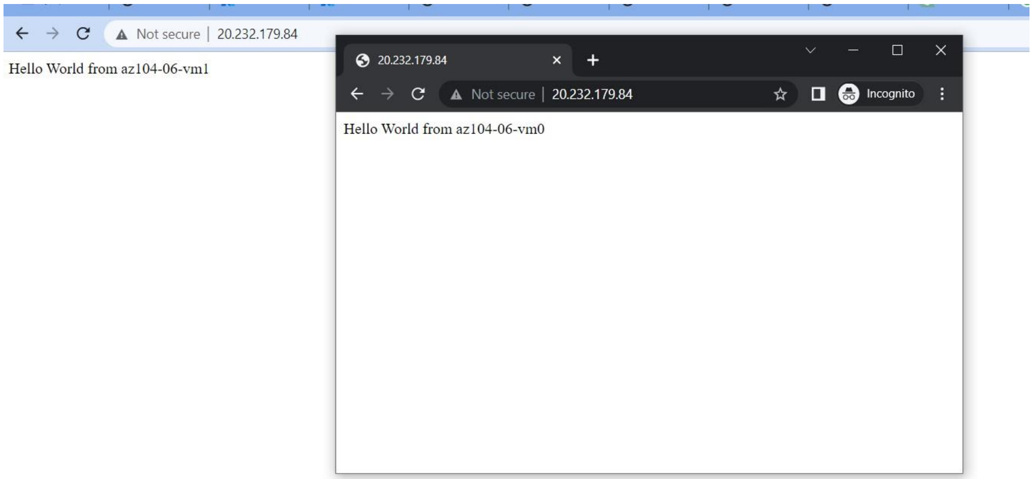
Hop by hop details

Name	Status	IP address	Next hop	RTT	Errors
az104-06-vm2	Info	10.62.0.4	10.60.0.4	-	-
az104-06-nic0	Info	10.60.0.4	10.63.0.4	-	-
az104-06-nic3	Info	10.63.0.4	-	-	-

Topology view

Task 5: Implement Azure Load Balancer

In this task, you will implement an Azure Load Balancer in front of the two Azure virtual machines in the hub virtual network. Refresh the window to verify the message changes to the other virtual machine. This demonstrates the load balancer rotating through the virtual machines.



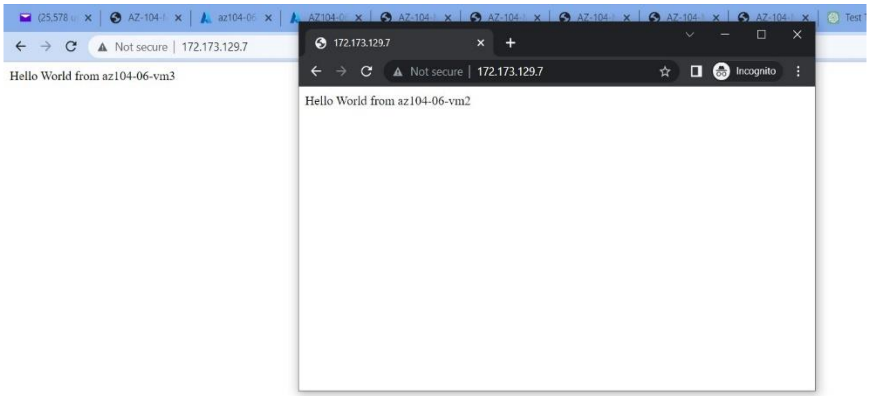
Hello World from az104-06-vm1

Hello World from az104-06-vm0

Task 6: Implement Azure Application Gateway

1. In the Azure portal, search and select **Application Gateways** and, on the **Application Gateways** blade, click **+ Create**.

Refresh the window to verify the message changes to the other virtual machine.



Hello World from az104-06-vm3

Hello World from az104-06-vm2