# M08-Unit 3 Monitor a load balancer resource using Azure Monitor

Exercise scenario

In this exercise, you will create an internal load balancer for the fictional Contoso Ltd organization. Then you will create a Log Analytics workspace, and use Azure Monitor Insights to view information about your internal load balancer. You will view the Functional Dependency View, then view detailed metrics for the load balancer resource, and view resource health information for the load balancer. Finally, you will configure the load balancer's diagnostic settings to send metrics to the Log Analytics workspace you created.

The diagram below illustrates the environment you will be deploying in this exercise.
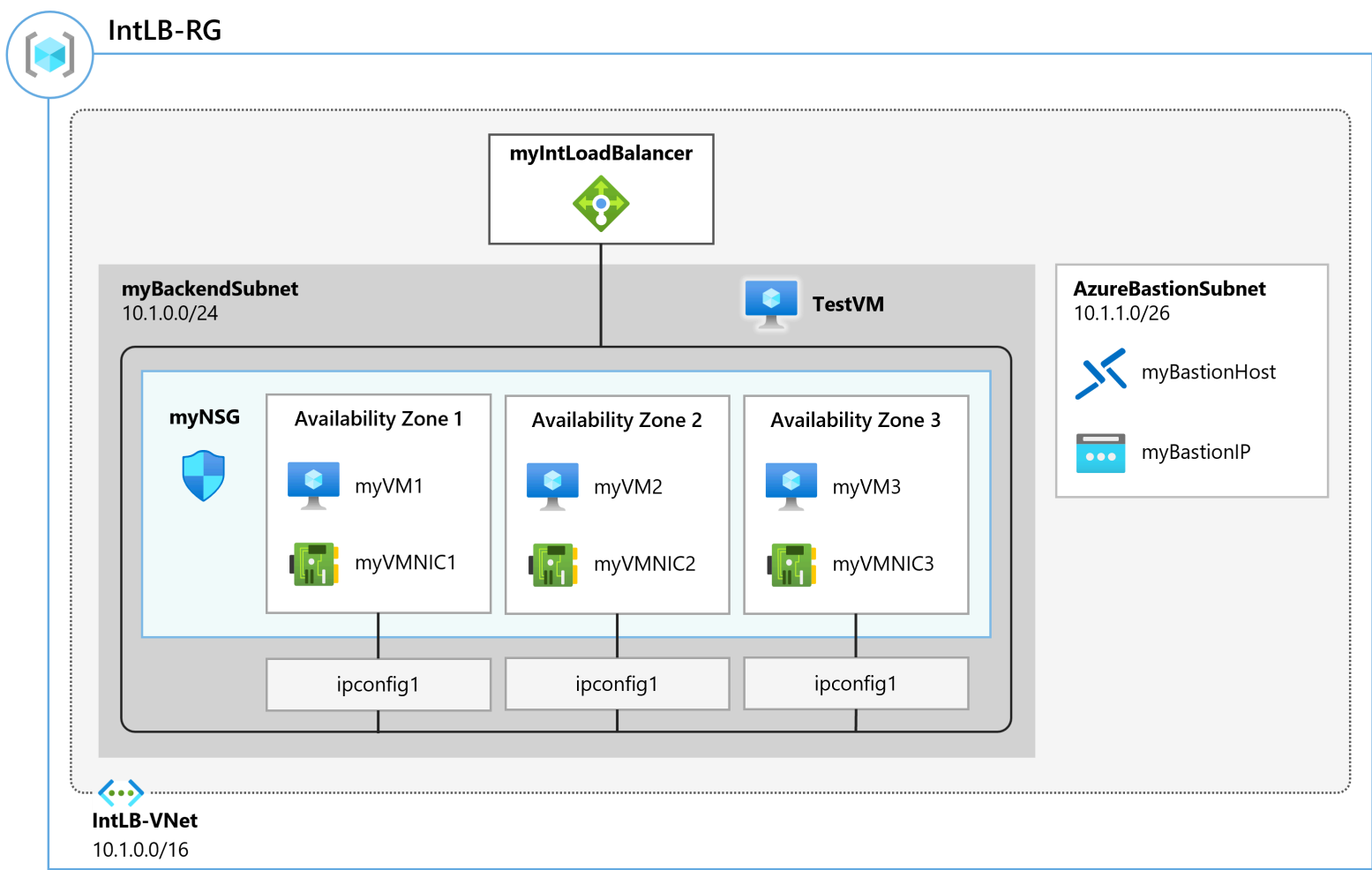
In this exercise, you will:

- Task 1: Create the virtual network
- Task 2: Create the load balancer
- Task 3: Create a backend pool
- Task 4: Create a health probe
- Task 5: Create a load balancer rule
- Task 6: Create backend servers
- Task 7: Add VMs to the backend pool
- Task 8: Test the load balancer
- Task 9: Create a Log Analytics Workspace
- Task 10: Use Functional Dependency View
- Task 11: View detailed metrics
- Task 12: View resource health

- Task 13: Configure diagnostic settings

> ! **Note**: An **interactive lab simulation** is available that allows you to click through this lab at your own pace. You may find slight differences between the interactive simulation and the hosted lab, but the core concepts and ideas being demonstrated are the same.

> **!** [!Note]
>
>   You may find slight differences between the instructions and the Azure portal interface, but the core concept is the same.

Estimated time: 55 minutes

Task 1: Create the virtual network

In this section, you will create a virtual network and a subnet.

1. Log in to the Azure portal.

2. On the Azure portal home page, search **Virtual Network** and select virtual network under services.

3. Select **+ Create**.

4. On the **Basics** tab, use the information in the table below to create the virtual network.

Setting	Value
Subscription	Select your subscription
Resource group	Select **Create new**
	Name: **IntLB-RG**
Name	**IntLB-VNet**
Region	**(US) West US**

5. Select **Next : IP Addresses**.

6. On the **IP Addresses** tab, in the **IPv4 address space** box, enter **10.1.0.0/16**.

7. Above **Subnet name**, select **+ Add subnet**.

8. On the **Add subnet** pane, provide a subnet name of **myBackendSubnet**, and a subnet address range of **10.1.0.0/24**.

9. Select **Add**.

10. Select **Next : Security**.

11. Under **BastionHost** select **Enable**, then enter the information from the table below.

Setting	Value
Bastion name	**myBastionHost**
AzureBastionSubnet address space	**10.1.1.0/24**
Public IP address	Select **Create new** Name: **myBastionIP**

12. Select **Review + create**.

13. Select **Create**.

Task 2: Create the load balancer

In this section, you will create an internal Standard SKU load balancer. The reason we are creating a Standard SKU load balancer here in the exercise, instead of a Basic SKU load balance, is for later exercises that require a Standard SKU version of the load balancer.

1. On the Azure home page, in the search bar, enter **Load Balancer**

2. Select **Create Load Balancer**.

3. On the **Basics** tab, use the information in the table below to create the load balancer.

Setting	Value
Basics tab	
Subscription	Select your subscription
Resource group	**IntLB-RG**
Name	**myIntLoadBalancer**
Region	**(US) West US**
SKU	**Standard**
Type	**Internal**
Frontend IP configuration tab	+ Add a frontend IP configuration
Name	**LoadBalancerFrontEnd**
Virtual network	**IntLB-VNet**
Subnet	**myBackendSubnet**
IP address assignment	**Dynamic**

4. Select **Review + create**.

5. Select **Create**.

Task 3: Create a backend pool

The backend address pool contains the IP addresses of the virtual NICs connected to the load balancer.

1. On the Azure portal home page, select **All resources**, then select on **myIntLoadBalancer** from the resources list.

2. Under **Settings**, select **Backend pools**, and then select **Add**.

3. On the **Add backend pool** page, enter the information from the table below.

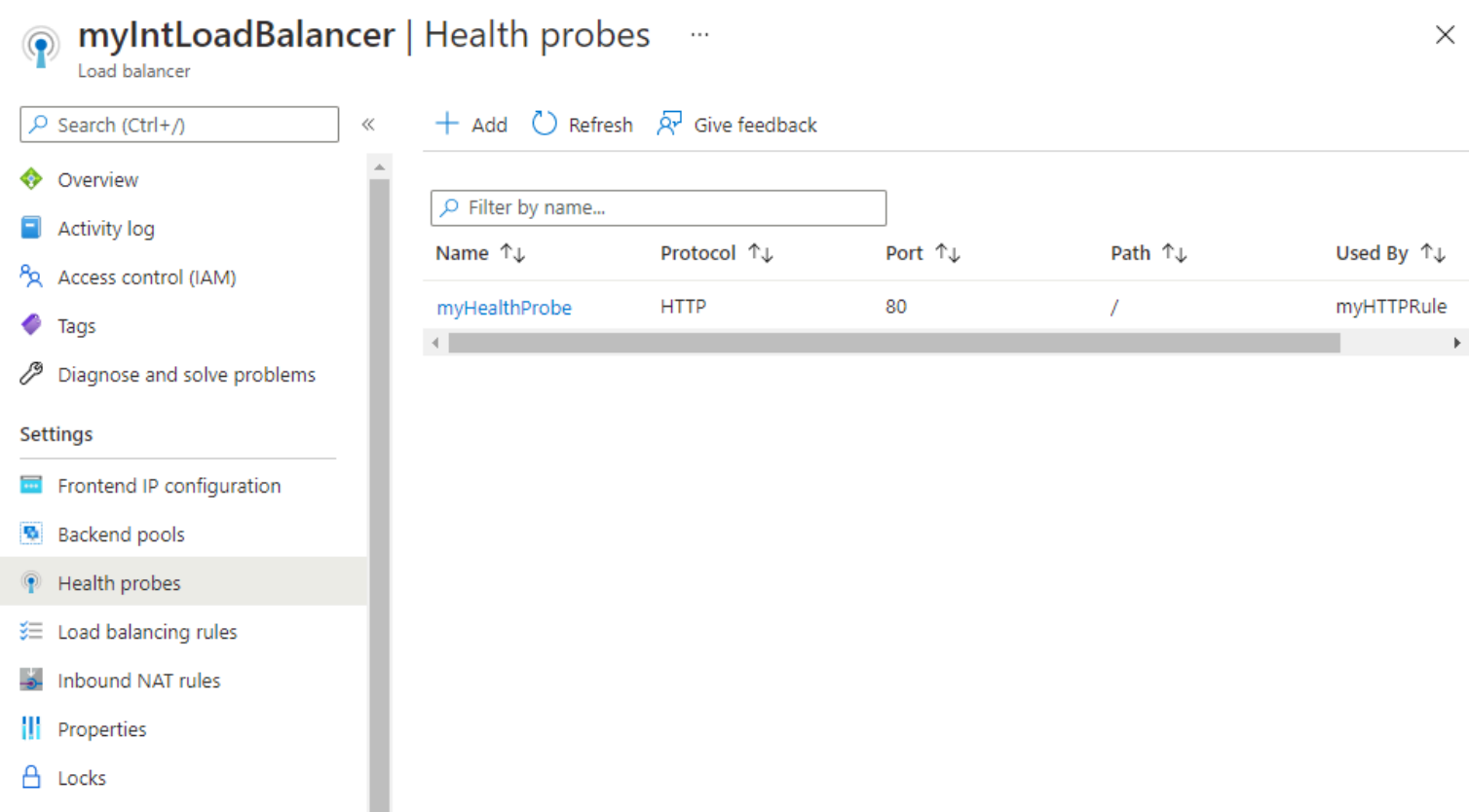| Setting	Value
Name	**myBackendPool**
Virtual network	**IntLB-VNet**
Backend Pool Configuration	**NIC**

4. Select **Add**.
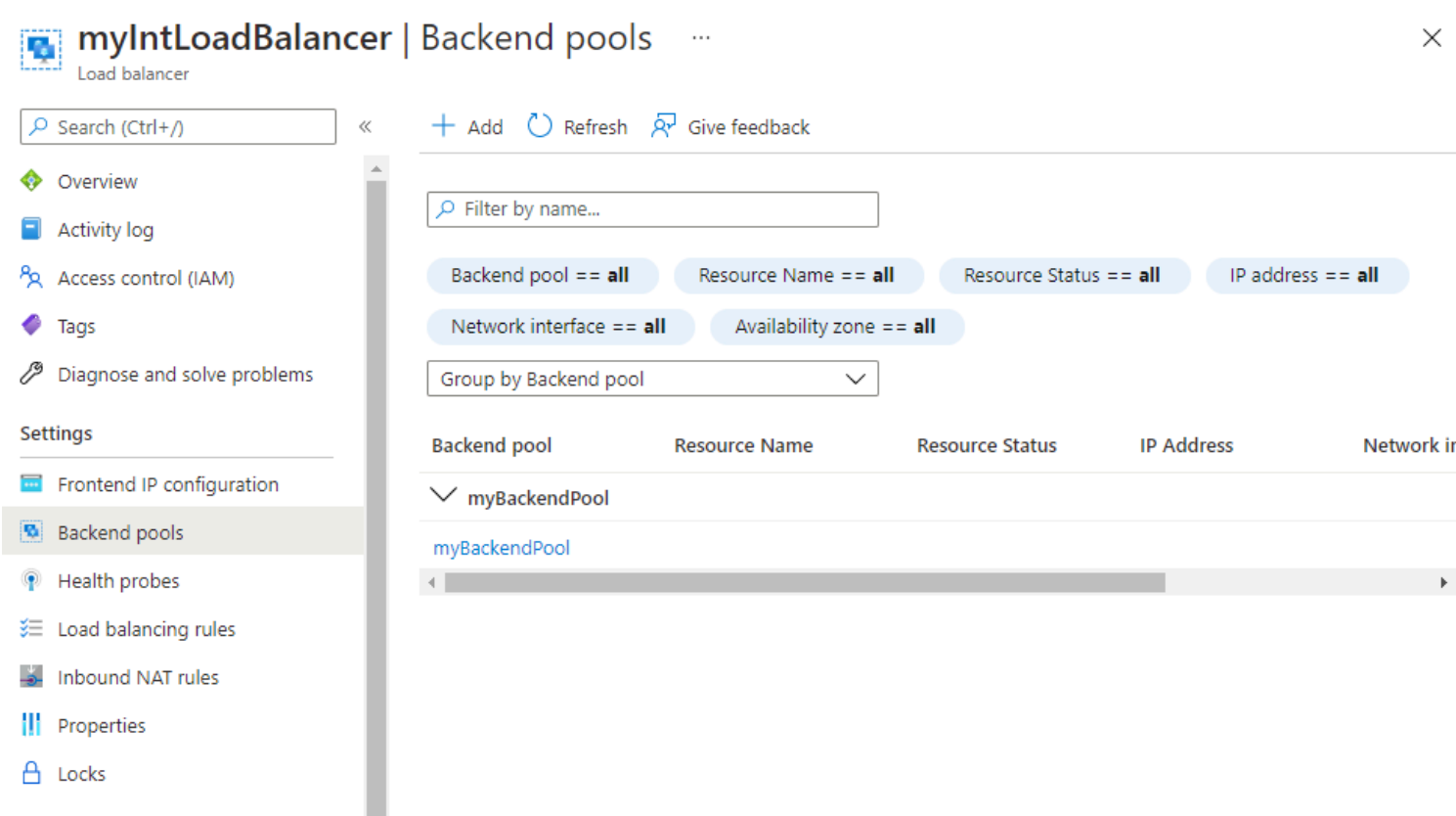
Task 4: Create a health probe

The load balancer monitors the status of your app with a health probe. The health probe adds or removes VMs from the load balancer based on their response to health checks. Here you will create a health probe to monitor the health of the VMs.

1. From the **Backend pools** page of your load balancer, under **Settings**, select **Health probes**, then select **Add**.

2. On the **Add health probe** page, enter the information from the table below.

Setting	Value
Name	**myHealthProbe**
Protocol	**HTTP**
Port	**80**
Path	**/**
Interval	**15**

3. Select **Add**.

myIntLoadBalancer | Health probes   ···

Load balancer

Search (Ctrl+/)   «

+ Add   ↻ Refresh   Give feedback

◆ Overview

▤ Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Frontend IP configuration

Backend pools

Health probes

Load balancing rules

Inbound NAT rules

Properties

Locks

Name ↑↓	Protocol ↑↓	Port ↑↓	Path ↑↓	Used By ↑↓
myHealthProbe	HTTP	80	/	myHTTPRule

Filter by name...

Task 5: Create a load balancer rule

A load balancer rule is used to define how traffic is distributed to the VMs. You define the frontend IP configuration for the incoming traffic and the backend IP pool to receive the traffic. The source and destination port are defined in the rule. Here you will create a load balancer rule.

1. From the **Backend pools** page of your load balancer, under **Settings**, select **Load balancing rules**, then select **Add**.

2. On the **Add load balancing rule** page, enter the information from the table below.

Setting	Value
Name	**myHTTPRule**
IP Version	**IPv4**
Frontend IP address	**LoadBalancerFrontEnd**
Protocol	**TCP**
Port	**80**
Backend port	**80**
Backend pool	**myBackendPool**
Health probe	**myHealthProbe**
Session persistence	**None**
Idle timeout (minutes)	**15**
Floating IP	**Disabled**

3. Select **Add**.

✔️ **myIntLoadBalancer** | Load balancing rules ⋯   ✕
Load balancer

Search (Ctrl+/) «	+ Add ⟳ Refresh 🗫 Give feedback
◆ Overview	
▤ Activity log	🔎 Filter by name...
ୡ Access control (IAM)	**Name** ↑↓ **Load balancing rule** ↑↓ **Backend pool** ↑↓ **Health probe** ↑↓
🏷 Tags	myHTTPRule myHTTPRule (TCP/80) myBackendPool myHealthProbe ⋯
🖉 Diagnose and solve problems	
Settings	
▦ Frontend IP configuration	
◪ Backend pools	
◉ Health probes	
≔ Load balancing rules	
▦ Inbound NAT rules	
‖ Properties	
🔒 Locks	

Task 6: Create backend servers

In this section, you will create three VMs for the backend pool of the load balancer, add the VMs to the backend pool, and then install IIS on the three VMs to test the load balancer.

1. In the Azure portal, select the Cloud Shell icon (top right). If necessary, configure the shell.

   - Select **PowerShell**.
   - Select **No Storage Account required** and your **Subscription**, then select **Apply**.
   - Wait for the terminal to create and a prompt to be displayed.

2. On the toolbar of the Cloud Shell pane, select the **Manage files** icon, in the drop-down menu, select **Upload** and upload the following files **azuredeploy.json** and **azuredeploy.parameters.json** into the Cloud Shell home directory one by one from the source folder **F:\Allfiles\Exercises\M08**.

3. Deploy the following ARM templates to create the virtual network, subnets, and VMs needed for this exercise:

   > ❗ **Note**: You will be prompted to provide an Admin password.

Code	📋 Copy

   ```
   $RGName = "IntLB-RG"


   New-AzResourceGroupDeployment -ResourceGroupName $RGName -TemplateFile azuredeploy.json -
   TemplateParameterFile azuredeploy.parameters.json
   ```

   > ❗ **Note:** This will take several minutes to deploy.

Task 7: Add VMs to the backend pool

1. On the Azure portal home page, select **All resources**, then select on **myIntLoadBalancer** from the resources list.

2. Under **Settings**, select **Backend pools**., and then select **myBackendPool**.

3. On the **Associated to** box, select **Virtual machines**.

4. Under **Virtual machines**, select **Add**.

5. Select the checkboxes for all 3 VMs (**myVM1**, **myVM2**, and **myVM3**), then select **Add**.

6. On the **myBackendPool** page, select **Save**.
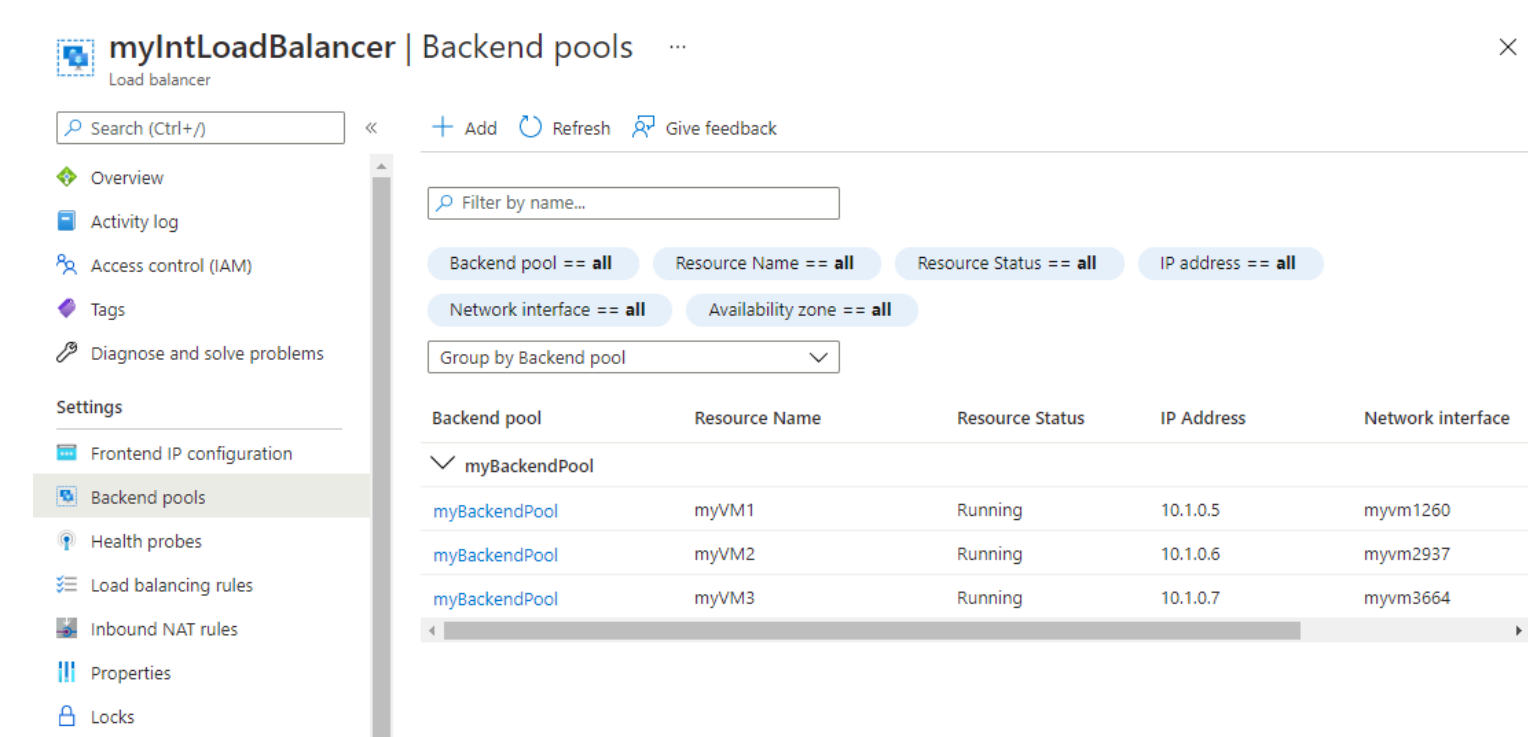
Task 8: Test the load balancer

In this section, you will create a test VM, and then test the load balancer.

Create test VM

> ! **Note**: You may find slight differences between the instructions and the Azure portal interface, but the core concept is the
> same.

1. On the Azure home page, using the global search enter **Virtual Machines** and select virtual machines
   under services.

2. Select **+ Create; + Virtual machine**, on the **Basics** tab, use the information in the table below to create the
   first VM.

Setting	Value
Subscription	Select your subscription
Resource group	**IntLB-RG**
Virtual machine name	**myTestVM**
Region	**(US) West US**
Availability options	**No infrastructure redundancy required**
Security type	**Standard**
Image	**See all images** –> **Datacenter for Windows Server 2019**
Size	**Standard_DS2_v3 - 2 vcpu, 8 GiB memory**
Username	**TestUser**
Password	**Provide a secure password**
Confirm password	**Provide a secure password**

3. Select **Next : Disks**, then select **Next : Networking**.

4. On the **Networking** tab, use the information in the table below to configure networking settings.

Setting	Value
Virtual network	**IntLB-VNet**
Subnet	**myBackendSubnet**
Public IP	Change to **None**
NIC network security group	**Advanced**
Configure network security group	Select the existing **myNSG**
Load balancing	**None** (or unchecked)

5. Select **Review + create**.

6. Select **Create**.

7. Wait for this last VM to be deployed before moving forward with the next task.

Connect to the test VM to test the load balancer

1. On the Azure portal home page, select **All resources**, then select on **myIntLoadBalancer** from the resources list.

2. On the **Overview** page, make a note of the **Private IP address**, or copy it to the clipboard. Note: you may have to select **See more** to see the **Private IP address**.

3. Select **Home**, then on the Azure portal home page, select **All resources**, then select on the **myTestVM** virtual machine that you just created.

4. On the **Overview** page, select **Connect**, then **Bastion**.

5. Select **Use Bastion**.

6. In the **Username** box, enter **TestUser** and in the **Password** box, enter the password you provided during deployment, then select **Connect**.

7. The **myTestVM** window will open in another browser tab.

8. If a **Networks** pane appears, select **Yes**.

9. Select the **Internet Explorer** icon in the task bar to open the web browser.

10. Select **OK** on the **Set up Internet Explorer 11** dialog box.

11. Enter (or paste) the **Private IP address** (e.g. 10.1.0.4) from the previous step into the address bar of the browser and press Enter.

12. The default web home page of the IIS Web server is displayed in the browser window. One of the three virtual machines in the backend pool will respond.

13. If you select the refresh button in the browser a few times, you will see that the response comes randomly from the different VMs in the backend pool of the internal load balancer.

Task 9:: Create a Log Analytics Workspace

1. On the Azure portal home page, select **All services**, then in the search box at the top of the page enter **Log Analytics**, and select **Log Analytics workspaces** from the filtered list.
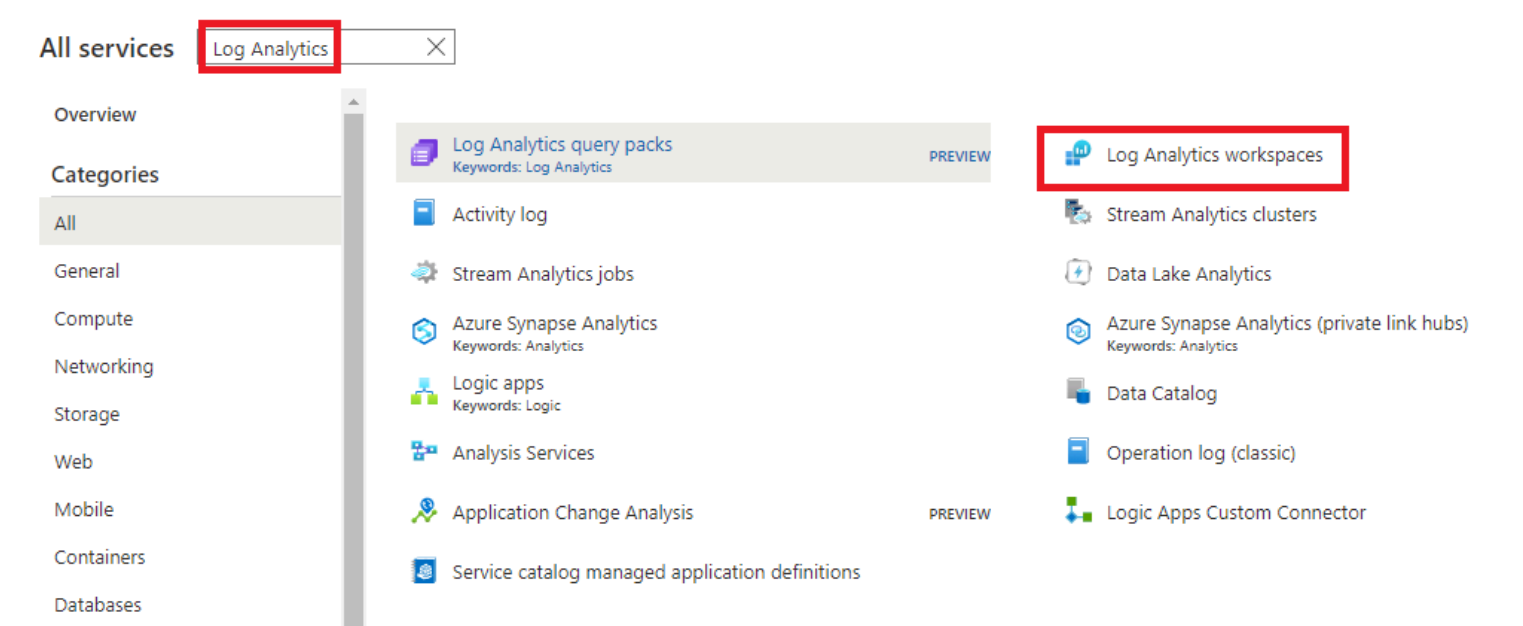
2. Select **Create**.

3. On the **Create Log Analytics workspace** page, on the **Basics** tab, use the information in the table below to create the workspace.

Setting	Value
Subscription	Select your subscription
Resource group	**IntLB-RG**
Name	**myLAworkspace**
Region	**West US**

4. Select **Review + Create**, then select **Create**.
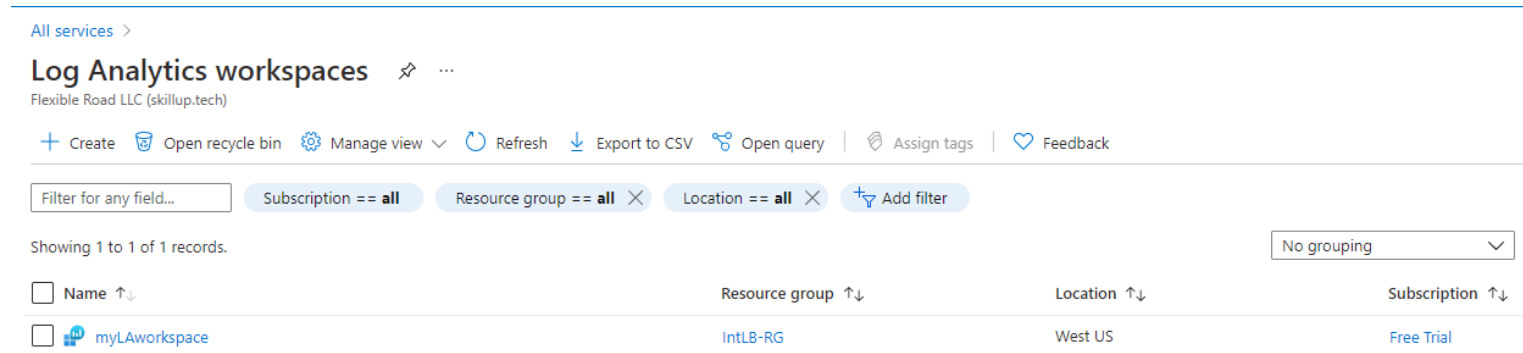
Task 10: Use Functional Dependency View

1. On the Azure portal home page, select **All resources**, then in the resources list, select **myIntLoadBalancer**.

Home >

All resources
Flexible Road LLC (skillup.tech)

+ Create   ⚙ Manage view ⌄   ↻ Refresh   ↓ Export to CSV   ⧉ Open query   ⊘ Assign tags   🗑 Delete | ♡ Feedback

Filter for any field...   Subscription == **all**   Resource group == **all** ✕   Type == **all** ✕   Location == **all** ✕   ⊕ Add filter

Showing 1 to 59 of 59 records.   ☐ Show hidden types ⓘ   No grouping ⌄   L

☐ Name ↑↓	Type ↑↓	Resource group ↑↓	Location ↑↓	Subscription ↑↓
☐ 🌐 Contoso-TMProfile	Traffic Manager profile	Contoso-RG-TM1	Global	Free Trial
☐ 🔷 ContosoAppServicePlanEastUS	App Service plan	Contoso-RG-TM1	East US	Free Trial
☐ 🔷 ContosoAppServicePlanWestEurope	App Service plan	Contoso-RG-TM2	West Europe	Free Trial
☐ 🌐 ContosoWebAppEastUS	App Service	Contoso-RG-TM1	East US	Free Trial
☐ 🌐 ContosoWebAppWestEurope	App Service	Contoso-RG-TM2	West Europe	Free Trial
☐ ⟨⟩ IntLB-VNet	Virtual network	IntLB-RG	West US	Free Trial
☐ ▦ myAvailabilitySet	Availability set	IntLB-RG	West US	Free Trial
☐ ✕ myBastionHost	Bastion	IntLB-RG	West US	Free Trial
☐ ▦ myBastionIP	Public IP address	IntLB-RG	West US	Free Trial
☐ ◈ myIntLoadBalancer	Load balancer	IntLB-RG	West US	Free Trial
☐ ◈ myIntLoadBalancer-1	Load balancer	IntLB-RG	West US	Free Trial
☐ ⧉ myLAworkspace	Log Analytics workspace	IntLB-RG	West US	Free Trial

2. Under **Monitoring**, select **Insights**.

3. In the top right corner of the page, select the **X** to close the **Metrics** pane for now. You will open it again shortly.

4. This page view is known as Functional Dependency View, and in this view, you get a useful interactive diagram, which illustrates the topology of the selected network resource - in this case a load balancer. For Standard Load Balancers, your backend pool resources are color-coded with Health Probe status indicating the current availability of your backend pool to serve traffic.

5. Use the **Zoom In (+)** and **Zoom Out (-)** buttons in the bottom right corner of the page, to zoom in and out of the topology diagram (alternatively you can use your mouse wheel if you have one). You can also drag the topology diagram around the page to move it.

6. Hover over the **LoadBalancerFrontEnd** component in the diagram, then hover over the **myBackendPool** component.

7. Notice that you can use the links in these pop-up windows to view information about these load balancer components and open their respective Azure portal blades.

8. To download a .SVG file copy of the topology diagram, select **Download topology**, and save the file in your **Downloads** folder.
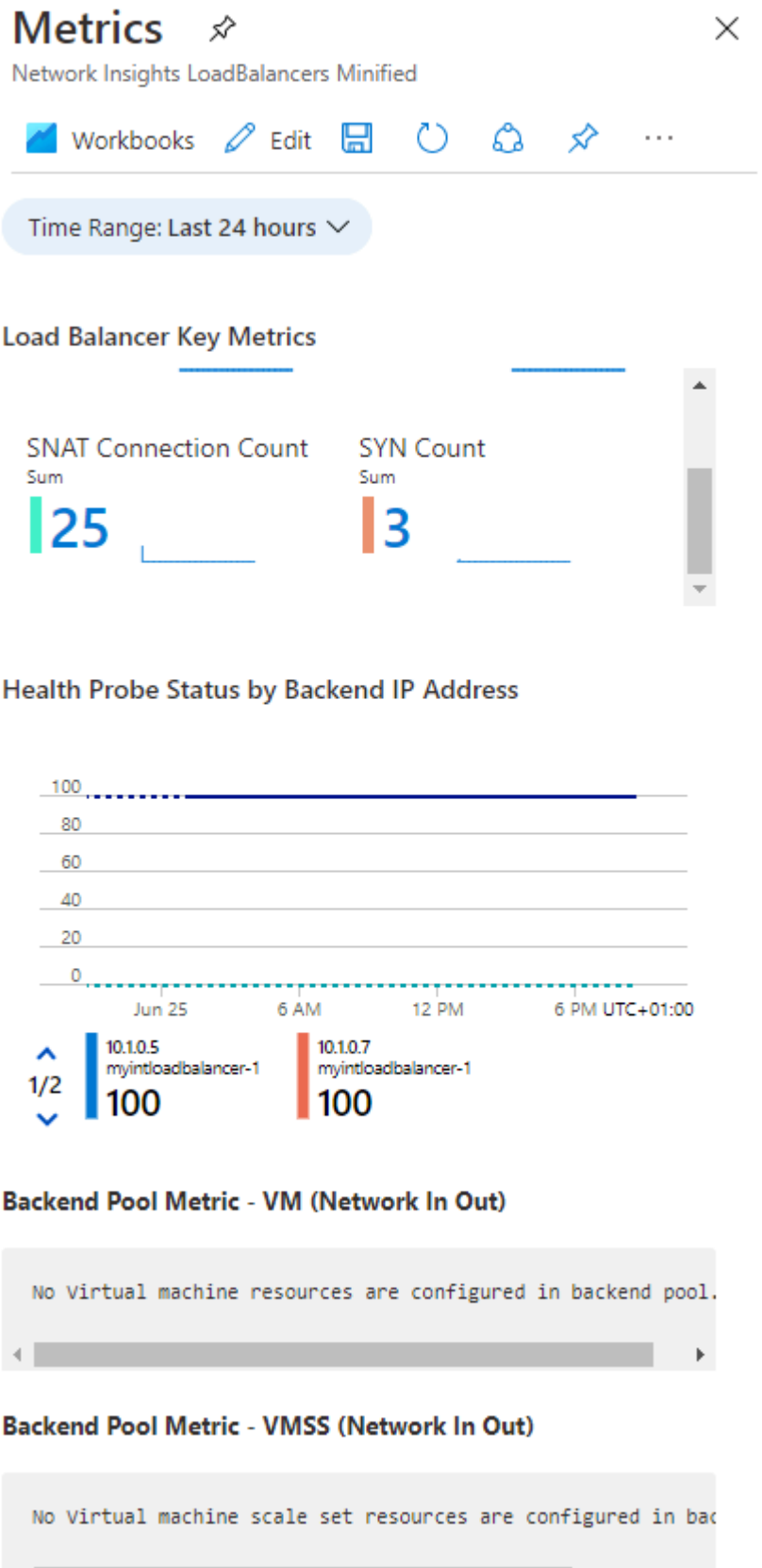
9. In the top right corner, select **View metrics** to reopen the metrics pane on the right-hand side of the
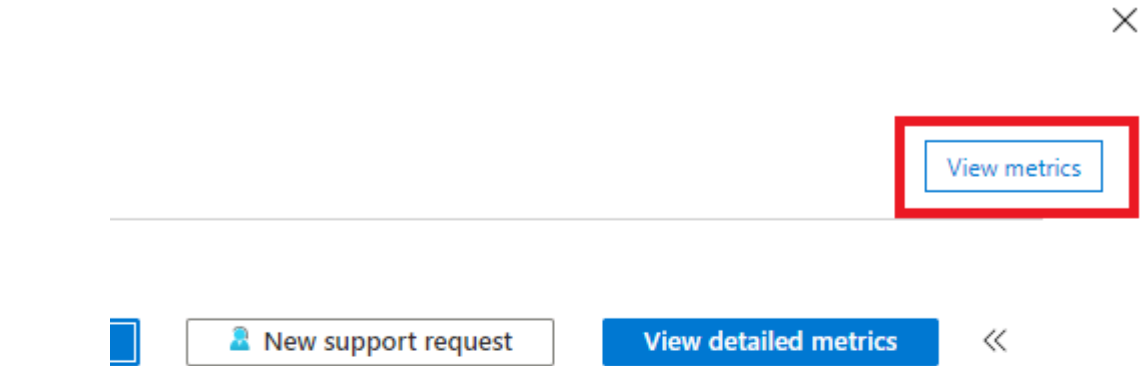
screen.
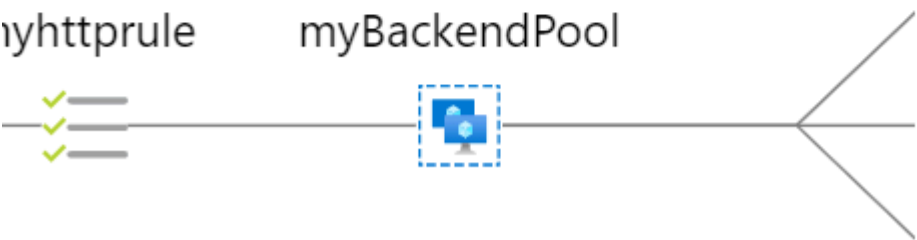
10. The Metrics pane provides a quick view of some key metrics for this load balancer resource, in the form of bar and line charts.

Task 11: View detailed metrics

1. To view more comprehensive metrics for this network resource, select **View detailed metrics**.

2. This opens a large full **Metrics** page in the Azure Network Insights platform. The first tab you land on is the **Overview** tab, which shows the availability status of the load balancer and overall Data Throughput and Frontend and Backend Availability for each of the Frontend IPs attached to your Load Balancer. These metrics indicate whether the Frontend IP is responsive and the compute instances in your Backend Pool are individually responsive to inbound connections.

3. Select the **Frontend & Backend Availability** tab and scroll down the page to see the Health Probe Status charts. If you see **values that are lower than 100** for these items, it indicates an outage of some kind on those resources.
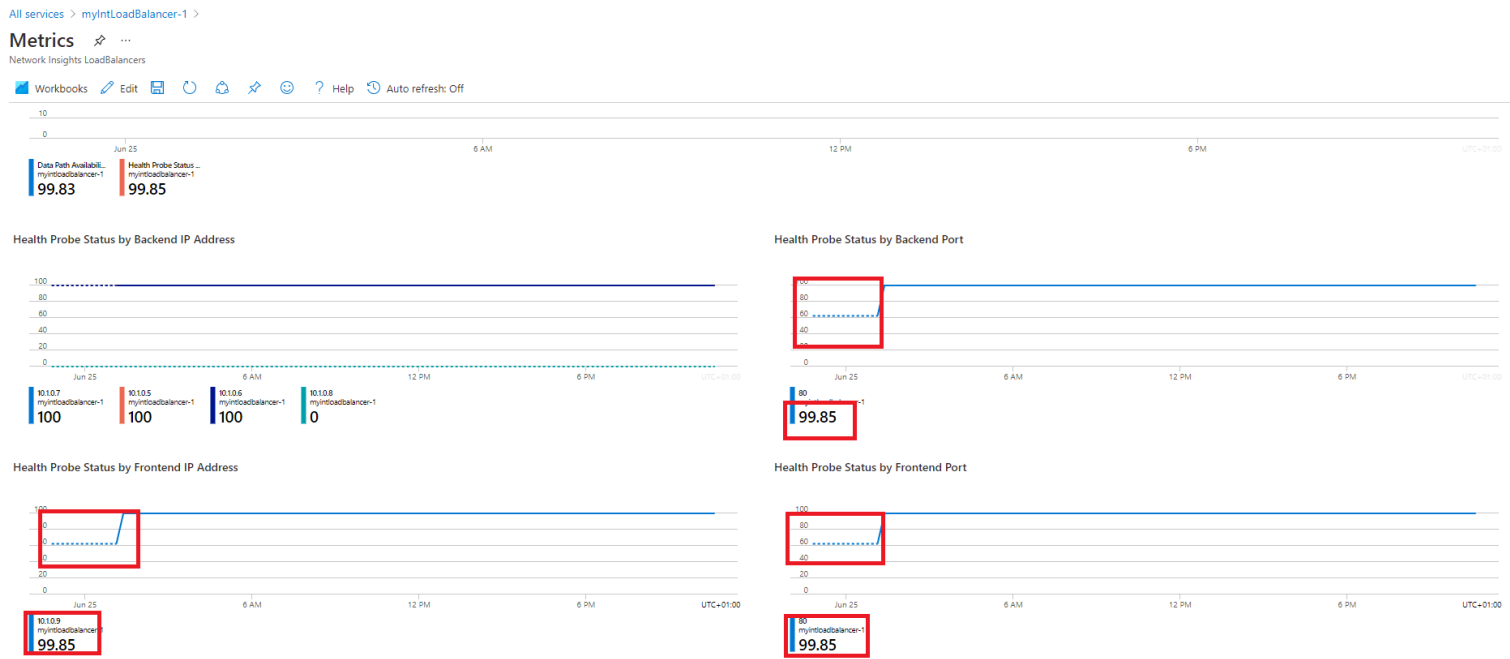
4. Select the **Data Throughput** tab and scroll down the page to see the other data throughput charts.

5. Hover over some of the data points in the charts, and you will see that the values change to show the exact value at that point in time.
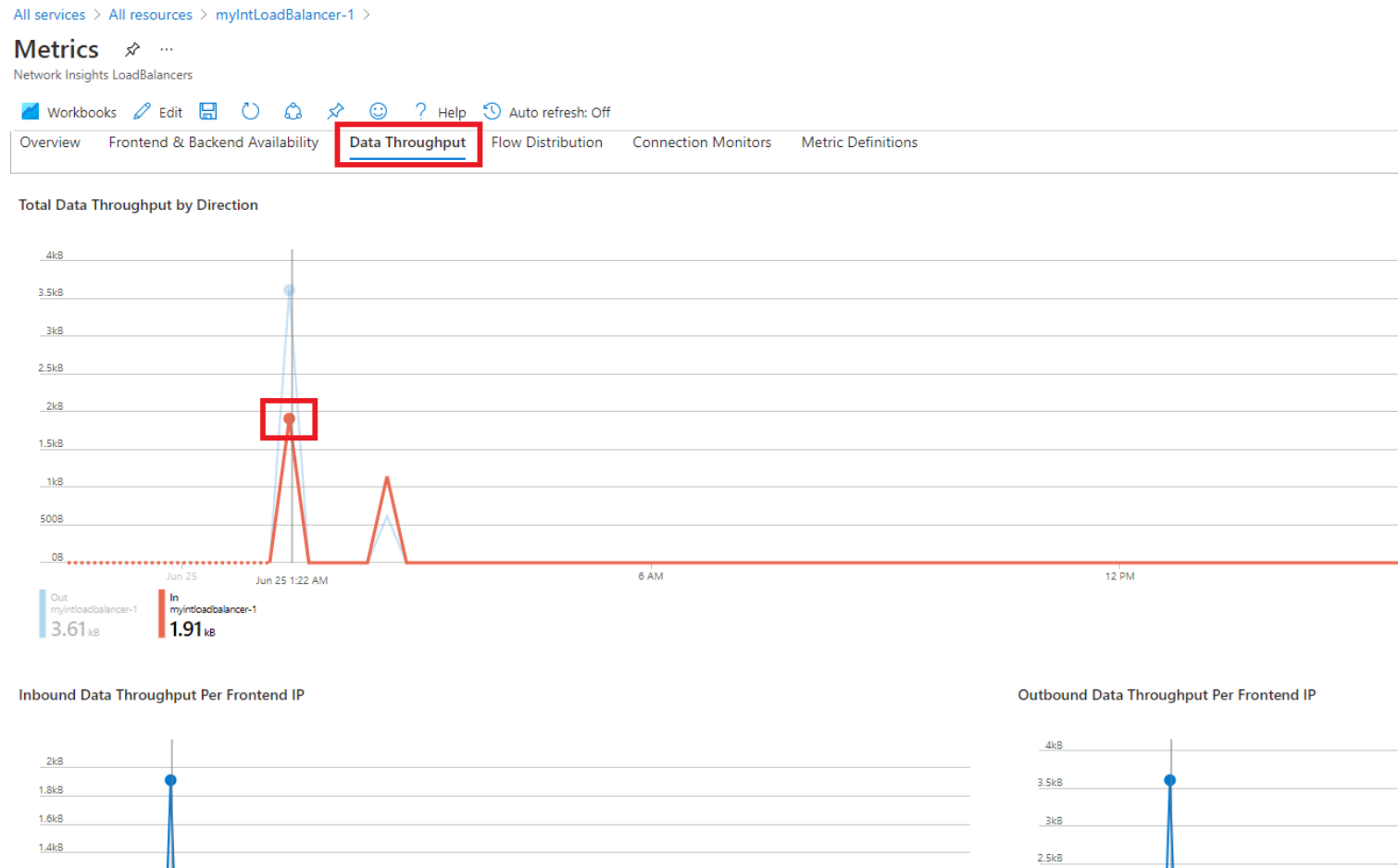
6. Select the **Flow Distribution** tab and scroll down the page to see the charts under the **VM Flow Creation and Network Traffic** section.
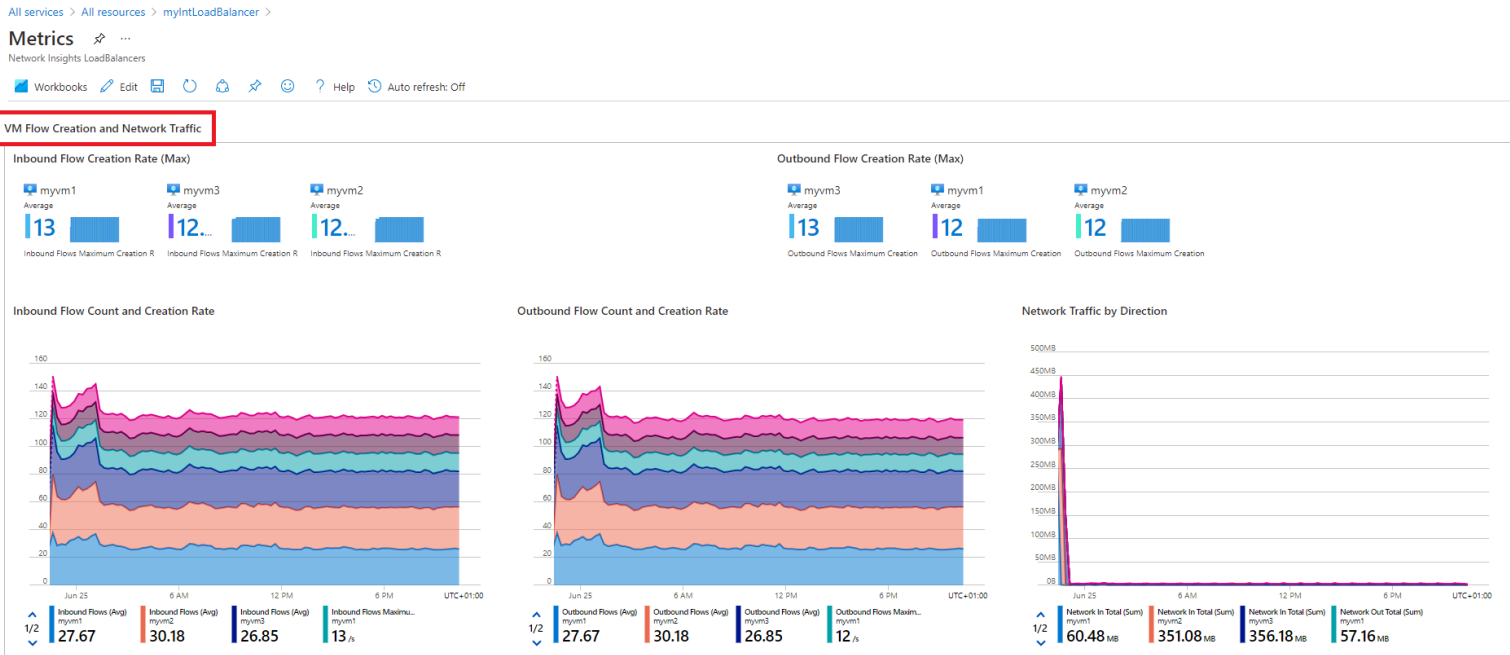
Task 12: View resource health

1. To view the health of your Load Balancer resources, on the Azure portal home page, select **All services**, then select **Monitor**.

2. On the **Monitor>Overview** page, in the left-hand menu select **Service Health**.

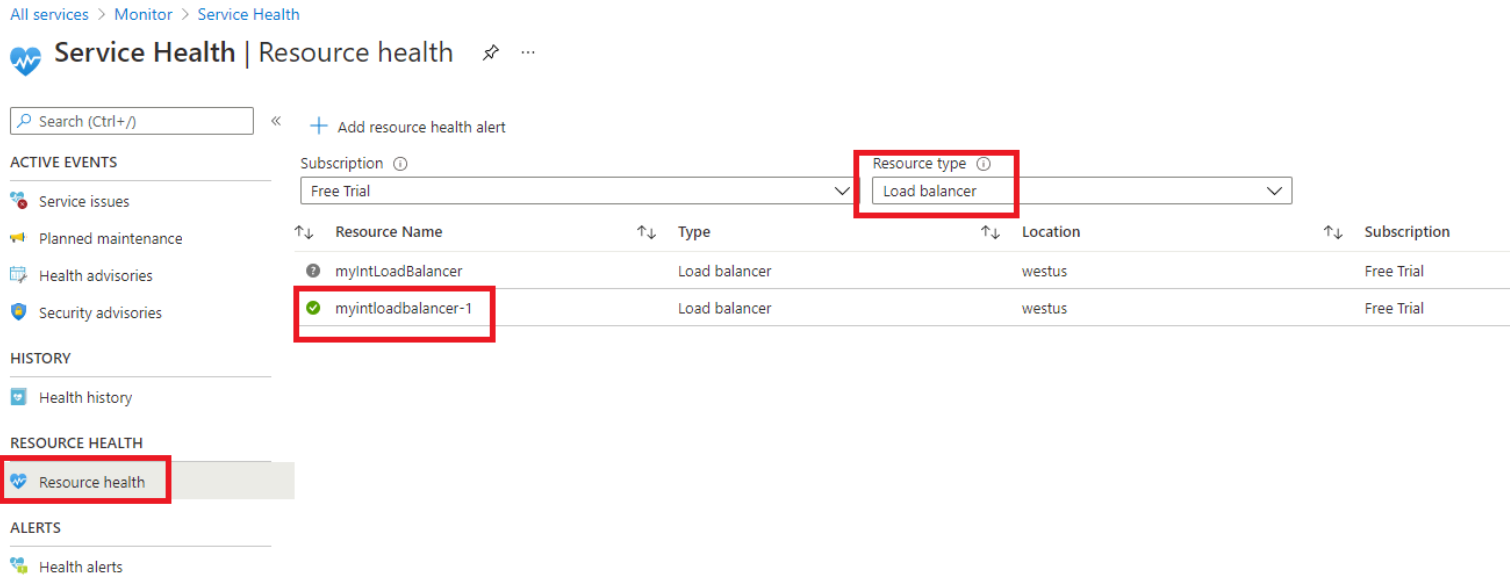3. On the **Service Health>Service issues** page, in the left-hand menu select **Resource Health**.

4. On the **Service Health>Resource health** page, in the **Resource type** drop-down list, scroll down the list and select **Load balancer**.

5. Then select the name of your load balancer from the list.

6. The **Resource health** page will identify any major availability issues with your load balancer resource. If there are any events under the **Health History** section, you can expand the health event to see more detail about the event. You can even save the detail about the event as a PDF file for later review and for reporting.
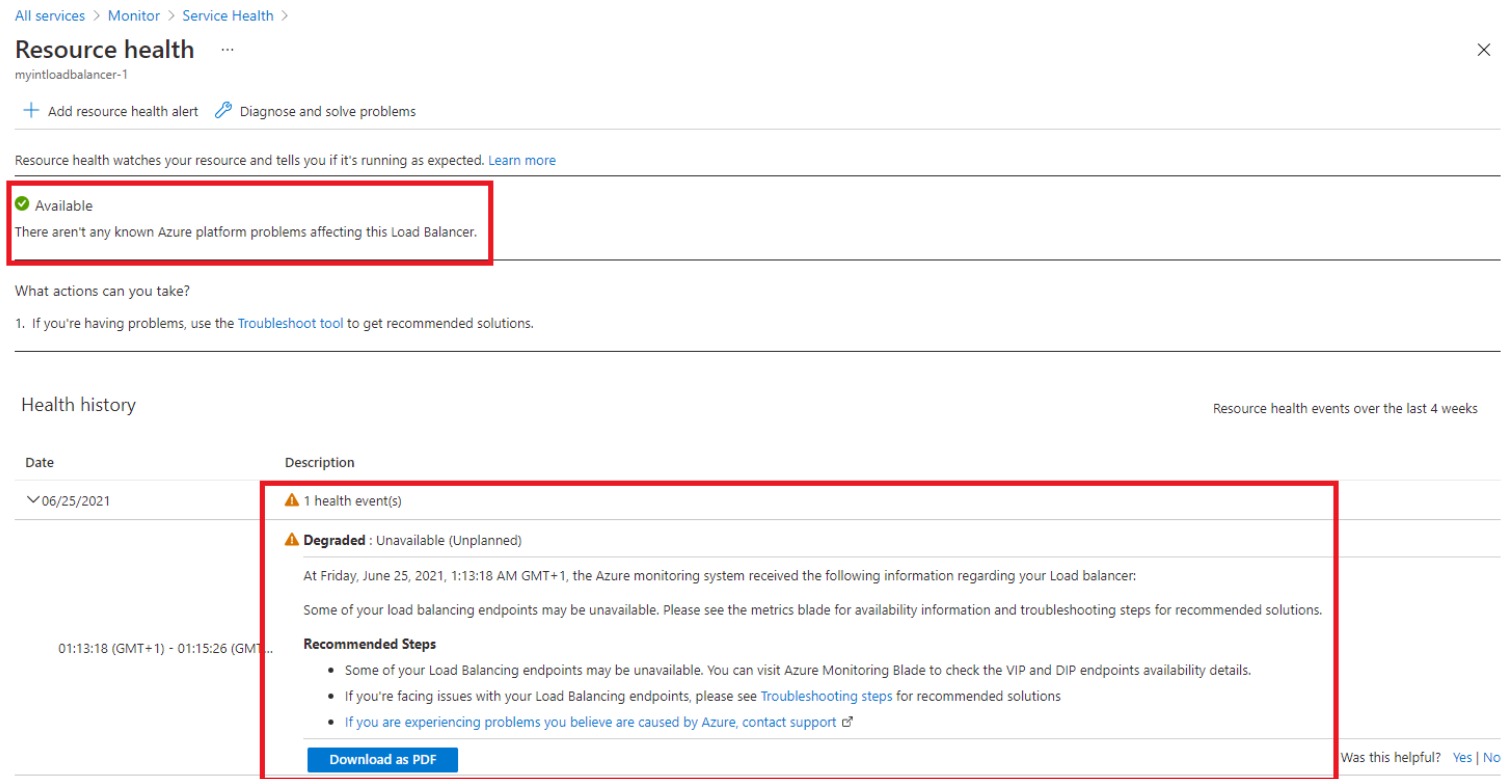
Task 13: Configure diagnostic settings

1. On the Azure portal home page, select **Resource groups**, then select the **IntLB-RG** resource group from the list.

2. On the **IntLB-RG** page, select the name of the **myIntLoadBalancer** load balancer resource in the list of resources.

3. Under **Monitoring**, select **Diagnostic settings**, then select **Add diagnostic setting**.
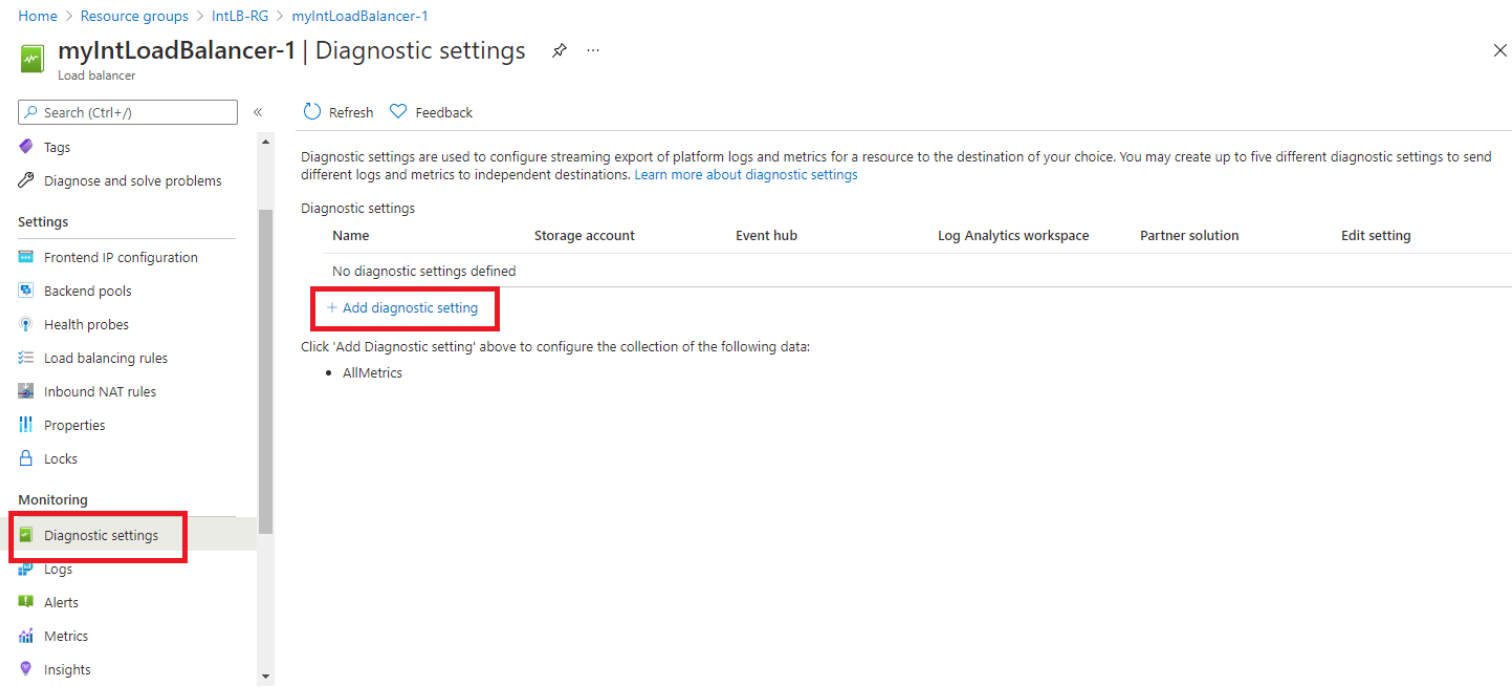
4. On the **Diagnostic setting** page, in the name box, enter **myLBDiagnostics**.

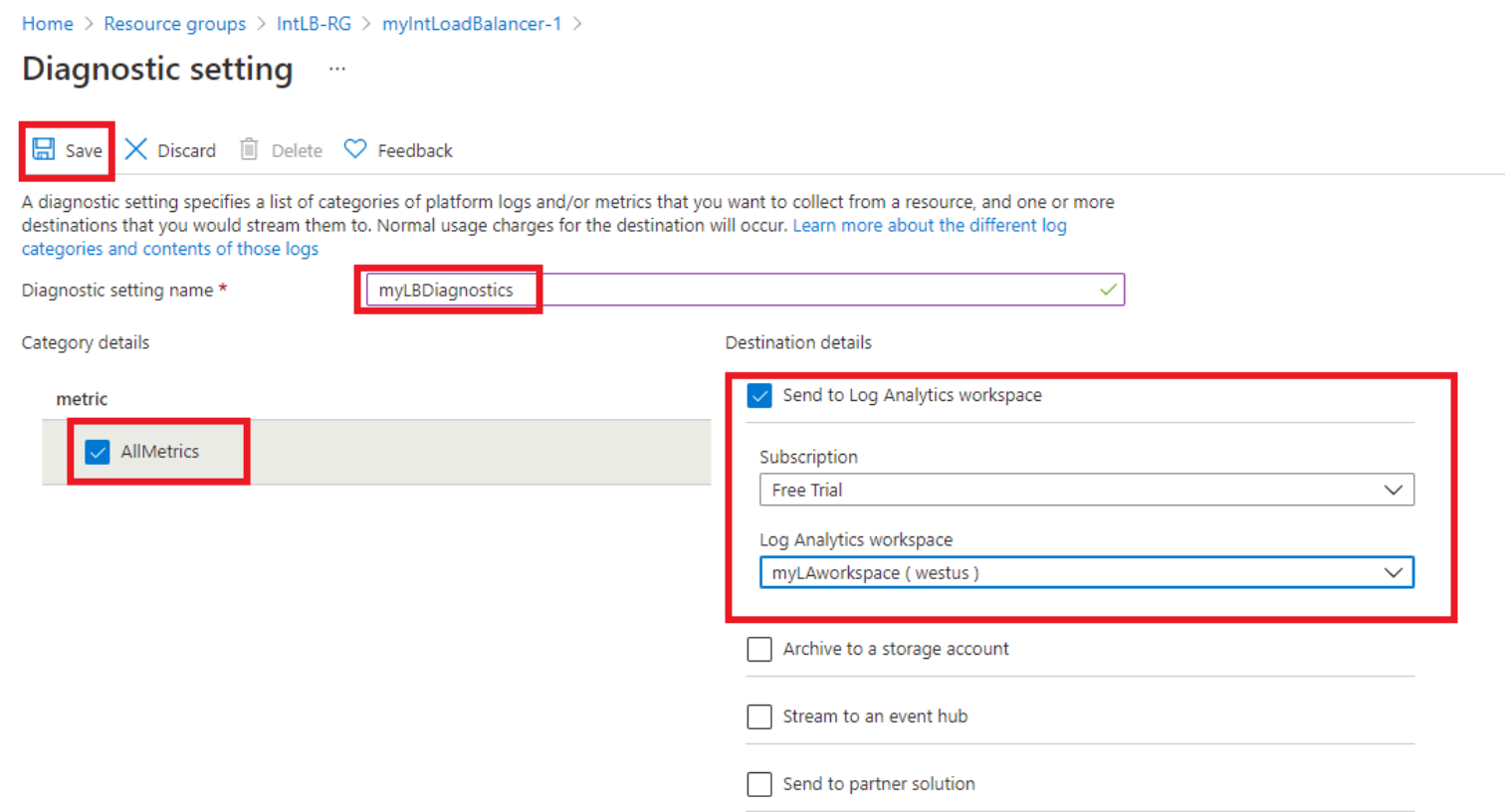5. Select the **AllMetrics** checkbox, then select the **Send to Log Analytics workspace** checkbox.

6. Select your subscription from the list, then select **myLAworkspace (westus)** from the workspace drop-down list.

7. Select **Save**.

Clean up resources

> ! **Note**: Remember to remove any newly created Azure resources that you no longer use. Removing unused resources ensures you will not see unexpected charges.

1. On the Azure portal, open the **PowerShell** session within the **Cloud Shell** pane.

2. Delete all resource groups you created throughout the labs of this module by running the following command:

```
Remove-AzResourceGroup -Name 'IntLB-RG' -Force -AsJob
```

> ! **Note**: The command executes asynchronously (as determined by the -AsJob parameter), so while you will be able to run another PowerShell command immediately afterwards within the same PowerShell session, it will take a few minutes before the resource groups are actually removed.

Extend your learning with Copilot

Copilot can assist you in learning how to use the Azure scripting tools. Copilot can also assist in areas not covered in the lab or where you need more information. Open an Edge browser and choose Copilot (top right) or navigate to *copilot.microsoft.com*. Take a few minutes to try these prompts.

- Summarize the Azure tools that are available for monitoring virtual networks.
- What Azure Network Watcher monitoring tools are available?

Learn more with self-paced training

- [Introduction to Azure Monitor](). In this module, you learn how to use Azure Monitor to provide insights into your Azure resource performance and operations.
- [Monitor and troubleshoot your end-to-end Azure network infrastructure by using network monitoring tools](). In this module, you learn to use Azure Network Watcher tools, diagnostics, and logs to help find and fix networking issues in your Azure infrastructure.

Key takeaways

Congratulations on completing the lab. Here are the main takeaways for this lab.

- Azure Monitor provides features and tools for collecting, managing, and analyzing IT data from all of your Azure, other cloud, and on-premises resources.
- Metrics are quantitative measurements that show snapshots of application or resource performance. Metrics are typically numeric values that you can measure over time.
- Logs are textual records of events, actions, and messages that occur in a resource or application.
- Azure Monitor Insights, visualizations, and dashboards can consume and transmit monitoring information about your applications.
- Alerts notify you of critical conditions and can take corrective action. Alert rules can be based on metric or log data.+