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Installation Guide LoadMaster in Azure Government

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Table of Contents

Chapter 1: Introduction 4

Load Balancing in Microsoft Azure 4

Known Issues/Limitations 7

Chapter 2: Installation Prerequisites 8

Chapter 3: Creating a LoadMaster in Azure Government VM 9

Licensing Options 9

Creating a LoadMaster in Azure Government VM 10

Enable a 10 Gb Interface (Optional) 15

Create an SSH Key Pair 18

Licensing and Initial Configuration 21

Chapter 4: Best Practices for Backups 23

Chapter 5: Change the 'bal' User Password using the Serial Console . . . 24

Chapter 6: References 25

1

Introduction

This document provides step-by-step instructions on how to deploy a Virtual LoadMaster using the Azure Resource Manager (ARM) portal. This document is intended to provide an overview of LoadMaster in Azure Government and to introduce some basic aspects of LoadMaster functionality.

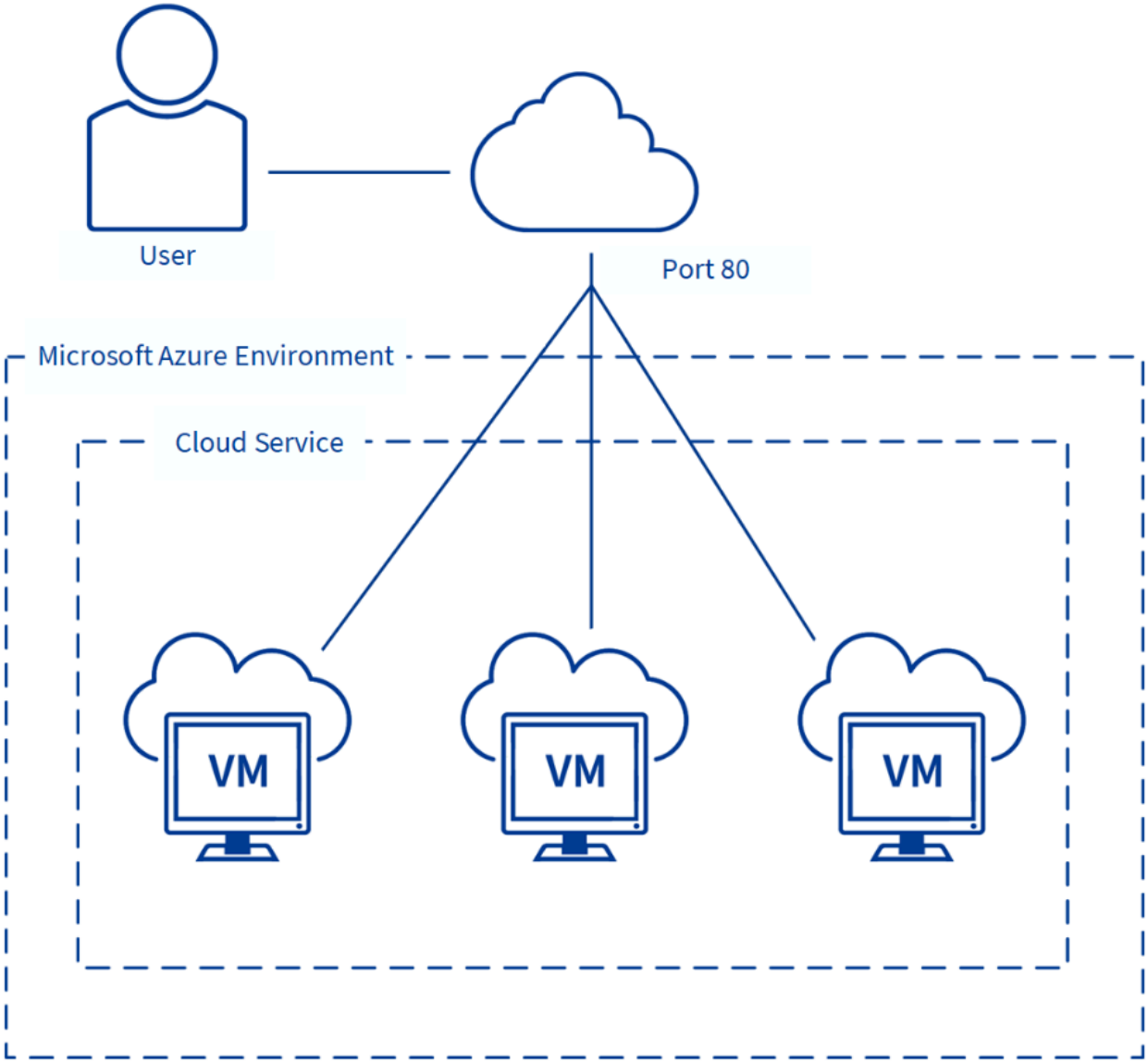
Contents

- Load Balancing in Microsoft Azure
- Known Issues/Limitations

Load Balancing in Microsoft Azure

Before we create a LoadMaster Virtual Machine (VM) with Azure Government, it is important to understand the traffic flow so that VMs in Microsoft Azure can be configured appropriately.

Microsoft Azure Infrastructure as a Service (IaaS) deployments accept traffic only on published endpoints. Any request to access Microsoft Azure workloads passes through the default load balancing layer of the Microsoft Azure platform. The figure below depicts the default deployment without the use of a LoadMaster in Azure.

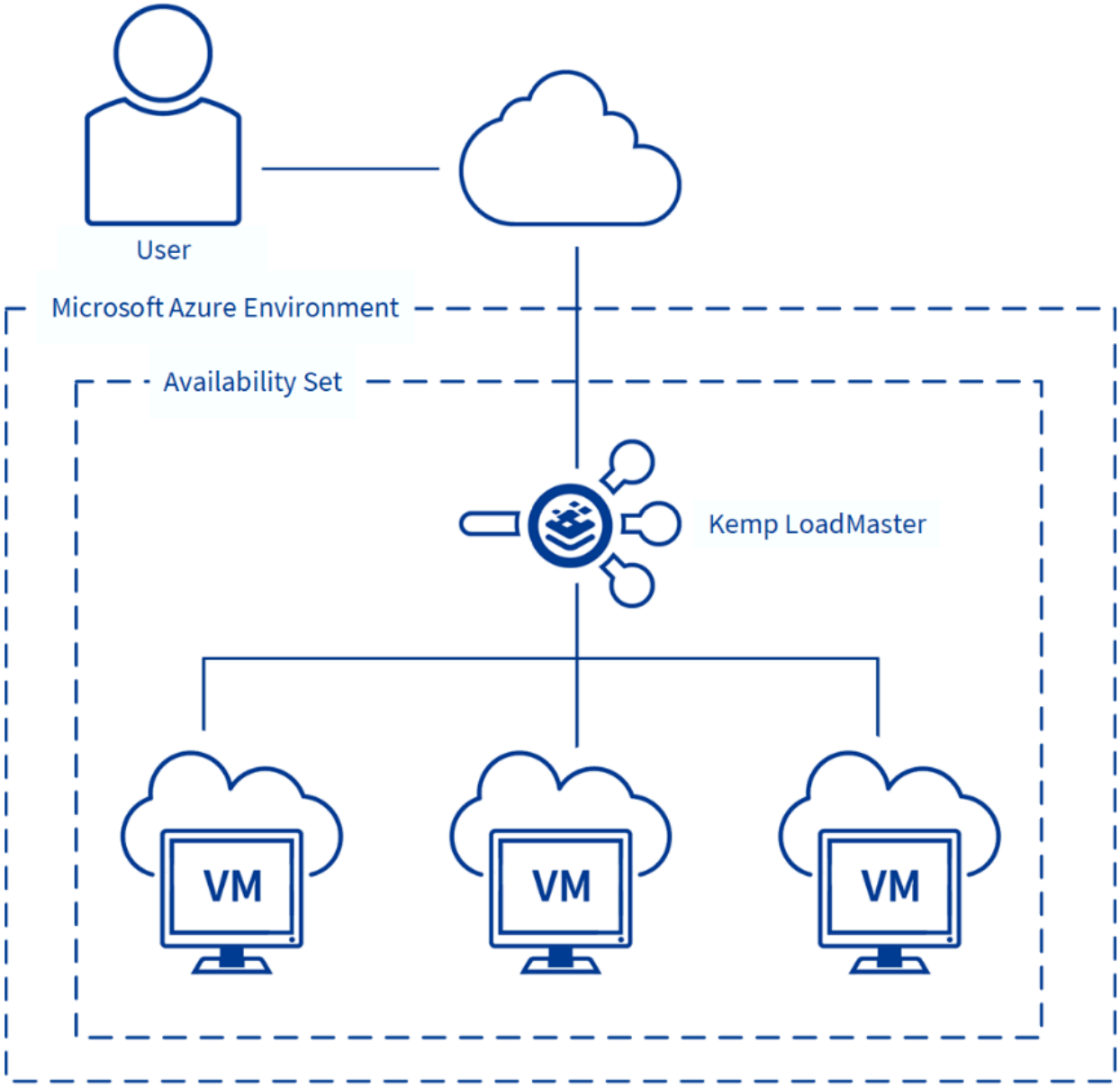


Any workload being published consists of an availability set, which represents a single VM or multiple VMs. When a VM is created, if an availability set exists, you have an option to connect the VM to an existing availability set. As more VMs are connected to an existing VM (and thus to an existing availability set), the built-in Microsoft Azure load balancer distributes connections when creating a load-balanced endpoint.

If you wish to use LoadMaster in Azure Government for your deployment, the following steps must be completed:

1. The LoadMaster in Azure Government needs to be deployed first.
2. All the VMs that need to be load balanced using the LoadMaster can then be created and must be connected to the existing LoadMaster VM to create the required grouping.
3. Finally, when creating endpoints, we cannot use the **Load-Balance traffic on an existing endpoint** option in Azure as we do not want to use the Microsoft Azure Load Balancer to load balance incoming connections.

The figure below depicts the flow when LoadMaster for Azure is deployed:



Notice that VM1, VM2 and VM3 in this example are grouped into a single availability set and the endpoint for published Virtual Services is created only on the LoadMaster VM. By doing this, we receive all load balanced traffic on the LoadMaster VM and the logic of load balancing incoming connections are applied as per the configured Virtual Service on the LoadMaster for a given workload.

Also, notice that VM1, VM2 and VM3 will not have any endpoints as they are not going to be published directly to the internet.

Note: There may be exceptions to this rule for connections that require direct connectivity to the VM such as Remote Desktop Connections to Windows Server OS.

For details on all of the supported configurations regarding multiple Public IP addresses along with multiple interfaces, refer to the following Knowledge Base article: Supported Network Configurations for LoadMaster

in Azure.

Known Issues/Limitations

There are some known issues/limitations to be aware of:

- Transparency is not possible in HA setups in Azure environments. For more information and requirements, refer to the **Transparency Feature Description** document on the Documentation page.
- Do not downgrade from firmware version 7.2.36 or higher to a version below 7.2.36. If you do this, the LoadMaster becomes inaccessible and you cannot recover it.
- The Virtual Service IP address must be the same IP address as the network interface.
- Alternate default gateway support is not permitted in a cloud environment.
- When setting up the LoadMaster in Azure, ensure that the **Enable OS guest diagnostics** check box is disabled because there is no support available for collection of diagnostics from the LoadMaster in Azure. If this option is enabled, the LoadMaster will not boot correctly.

The table below summarizes some of the limitations in Azure:

	Single unit, one-armed	**Single unit, two-armed**	**HA pair one-armed**	**HA pair two-armed**
Access Control List (ACL)	Requires that Server NAT is disabled if below firmware 7.2.50	Requires that Server NAT is disabled if below firmware 7.2.50	Requires that Server NAT is disabled if below firmware 7.2.50	Requires that Server NAT is disabled if below firmware 7.2.50
Transparency	Does not work	Works	Does not work	Does not work
10Gb NICs	7.2.48 and above	7.2.48 and above	7.2.48 and above	7.2.48 and above
Additional addresses	Works	Works	Does not work	Does not work
Virtual Service not on eth0	Not applicable	Works	Not applicable	Does not work

2

Installation Prerequisites

To support LoadMaster in Azure Government, the following are required:

- An active subscription of Microsoft Azure Virtual Machines
- A client computer running Windows 7 or newer
- Internet Explorer 9 or newer, or any modern browser
- A minimum of 2GB RAM on the cloud environment
- If you want to enable 10 Gb throughput for a LoadMaster virtual machine (VM) in Azure, you must select an Azure VM instance type that supports the 10 Gb Mellanox driver. Refer to the Sizes for Linux virtual machines in Azure page for further details.

Note: It is not possible to bond interfaces on Azure LoadMasters.

3

Creating a LoadMaster in Azure Government VM

Please ensure that the prerequisites documented in the earlier section are met.

Contents

- Licensing Options
- Creating a LoadMaster in Azure Government VM
- Licensing and Initial Configuration

Licensing Options

There are four main licensing options when deploying a LoadMaster in Azure Government:

- Hourly consumption
- Bring Your Own License (BYOL)
- Free version
- License Agreement - Service Provided License Agreement (SPLA)/Metered

To use the BYOL option, follow the steps below:

1. Deploy the **BYOL – Trial and perpetual license** version of the Virtual LoadMaster (follow the steps in the section below to do this).

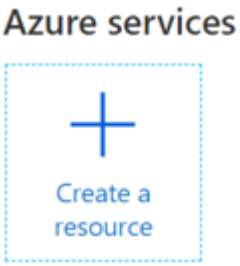
2. Contact a Progress Kemp representative to get a license.
3. Update the license on your LoadMaster to apply the license change (**System Configuration > System Administration > Update License**).
4. We recommend rebooting after updating the license.

Creating a LoadMaster in Azure Government VM

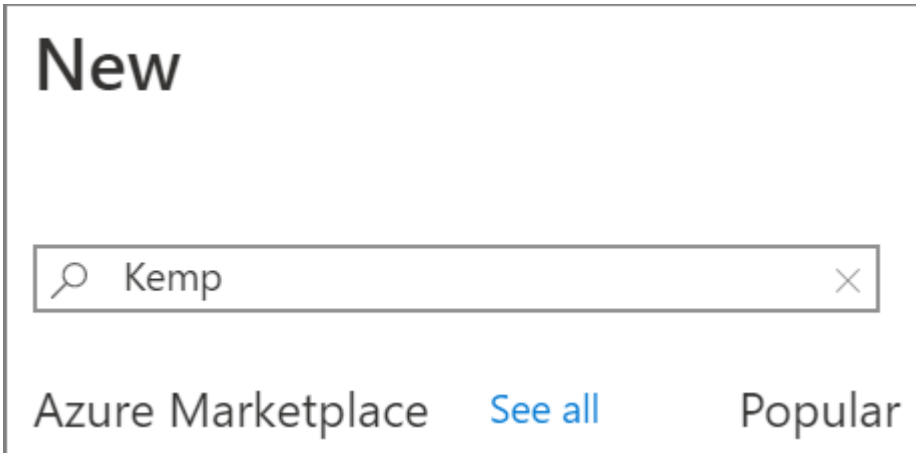
This section provides step-by-step instructions on how to deploy a Virtual LoadMaster.

The steps in this document reflect the steps in the Azure Marketplace (https://portal.azure.us).

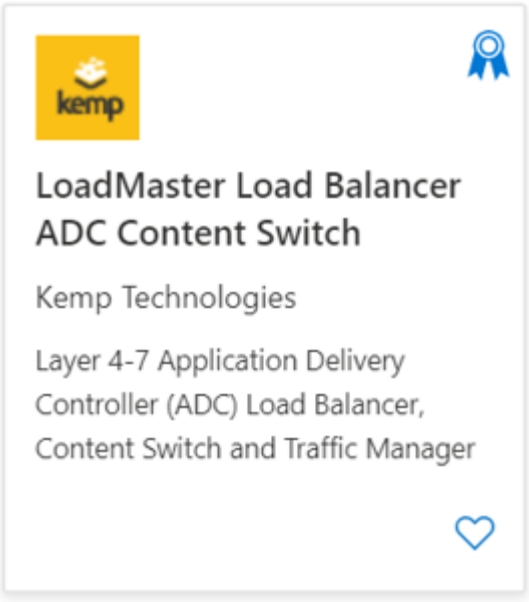
To deploy a new LoadMaster using ARM, follow the steps below:



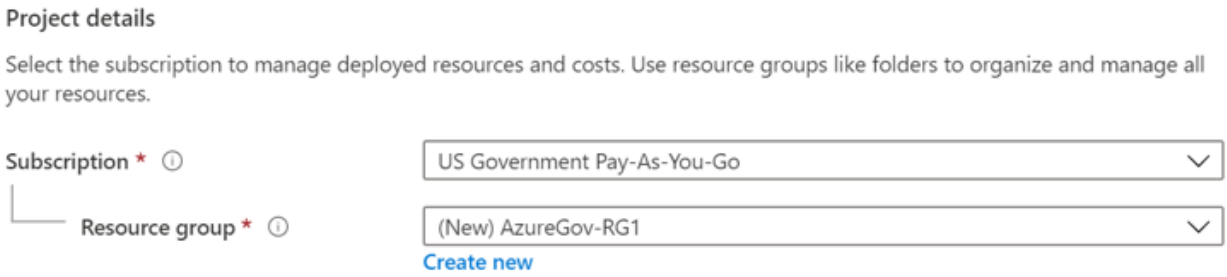
1. From the Azure Management Portal dashboard, click .



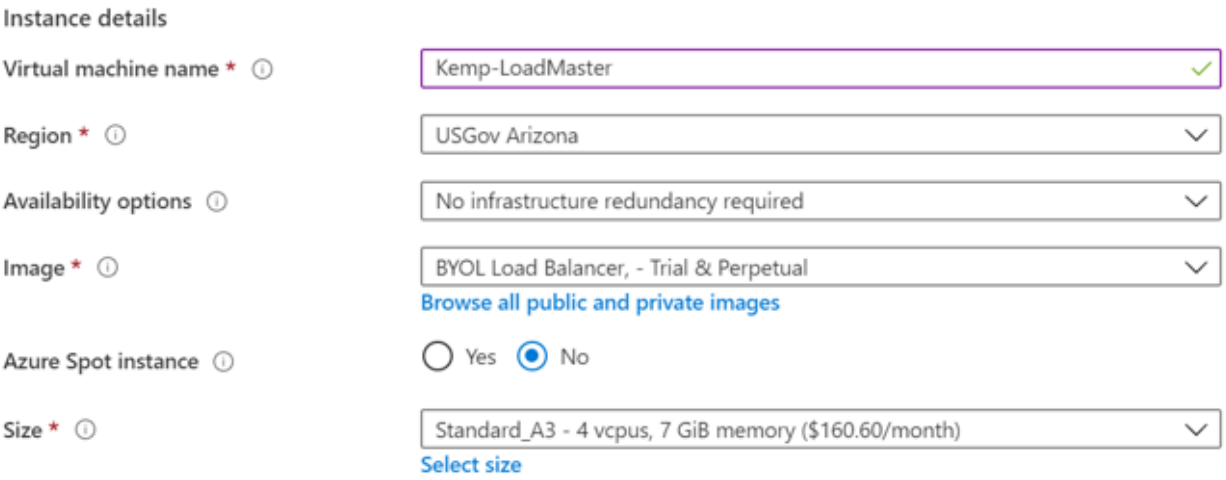
2. Enter **Kemp** in the search bar and press Enter on your keyboard.



3. Select **LoadMaster Load Balancer ADC Content Switch**.
4. From the drop-down menu, select the desired LoadMaster type and click **Create**.



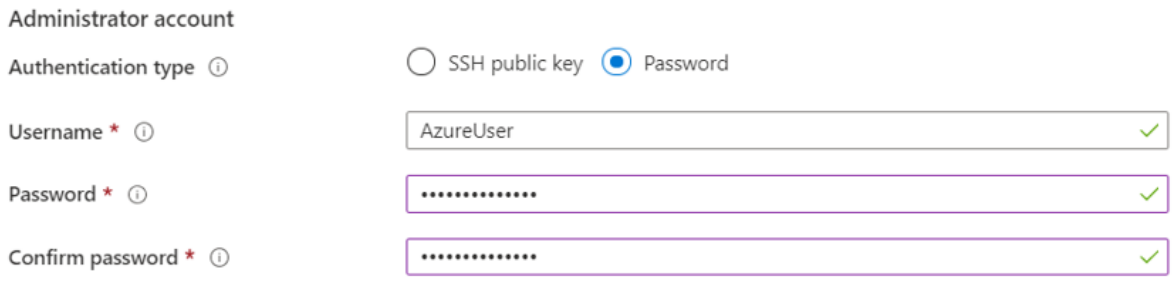
5. Under **Project details**, complete the following fields:.
   1. Select the **Azure Subscription**.
   2. Select an existing or create a new **Resource group** to deploy the LoadMaster into.



6. Under **Instance details**, complete the following fields:
   1. Enter a **Virtual machine name** for the LoadMaster.
   2. Select an Azure **Region**.
   3. Optionally select **Availability options** if you are deploying a High Availability (HA) pair.

   Note: The LoadMaster is compatible with Availability sets and Availability zones and it is preferred to use managed disks for production environments. Some settings are not available in all regions. Check with Microsoft if needed.

   4. Confirm that the desired LoadMaster type is selected in the **Image** drop-down list.
   5. Enable or disable **Azure Spot instance**.
   6. Select the desired **Size** for the virtual machine.



Note: If you want to enable 10 Gb throughput for a LoadMaster virtual machine (VM) in Azure, you must select an Azure VM instance type that supports the 10 Gb Mellanox driver. For more information, refer to the Enable a 10 Gb Interface section.

* VLM-MAX vCPU and RAM allocation can be assigned based on your requirements due to the uncapped performance available.

LoadMaster	Recommended vCPU	Recommended RAM
VLM-1G	8 vCPU	16 GiB
VLM-5G	16 vCPU	32 GiB
VLM-MAX	User defined *	User defined *

7. Under **Administrator account**, complete the following fields:
   1. Select the **Authentication type** (**SSH public key** or **Password**).

   Note: We recommend using a password, but either way will work fine.

   2. Enter a **Username**.

   Note: This username is not used by the LoadMaster for Azure. The default username to access the LoadMaster is **bal**.

   3. Enter a **Password** for the bal account and confirm the password.

   Note: This password is used to access the LoadMaster Web User Interface (WUI).

   4. **SSH public key source:** You can either create a new key pair, use an existing key stored in Azure,

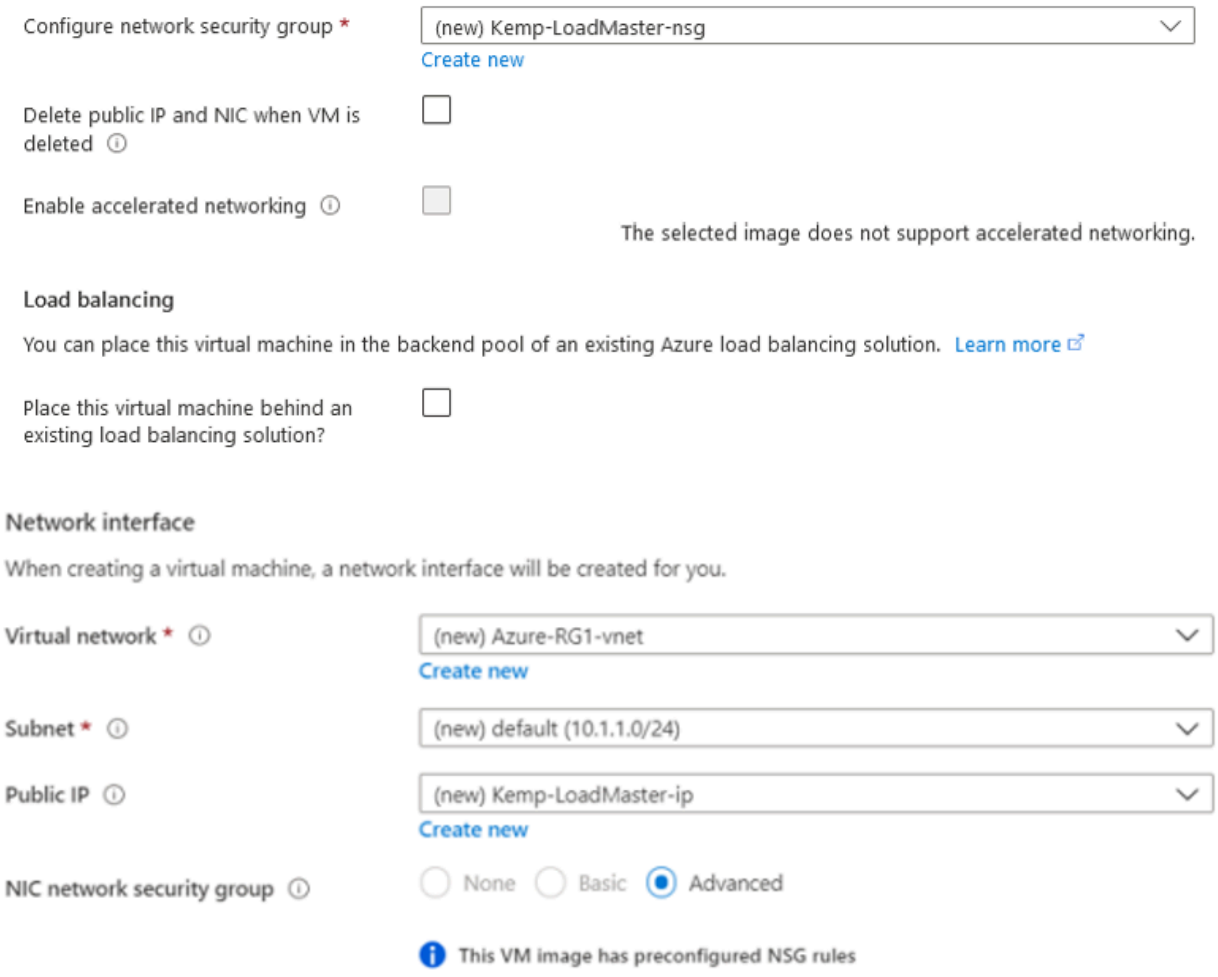
or use an existing public key. For further details on creating a new key pair, refer to the following section: Create an SSH Key Pair.

Note: It is recommended to store SSH keys in a secure location.

8. Click **Next: Disks**.
9. Leave the defaults for **Disk options** and **Data disks**.



10. Click **Next: Networking**.



11. Under **Network interface**, complete the following fields:
    1. Select an existing or create a new **Virtual network**.
    2. Select an existing or create a new **Subnet**.
    3. Select an existing or create a new **Public IP**.
    4. Keep the default setting for **NIC network security group**.

Note: If you want to enable 10 Gb throughput for a LoadMaster VM in Azure, you must select an

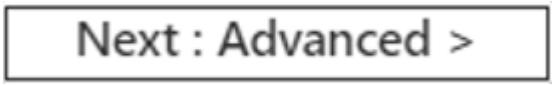
Azure VM instance type that supports the 10 Gb Mellanox driver. This can be enabled after the LoadMaster has been deployed, for more information, refer to the Enable a 10 Gb Interface section.

Note: The security group should contain rules for port 8443 (management), 22 (SSH), and any other ports that are needed by the back-end. Do not block port 6973.

5. If you are deploying a HA pair of LoadMasters, you can select an existing load balancer.



12. Click **Next: Management**.
13. You can optionally make any necessary changes to the **Monitoring**, **Identity**, and **Auto-Shutdown** sections or leave them as default.



Note: Ensure that the **Enable OS guest diagnostics** check box is disabled because there is no support available for collection of diagnostics from the LoadMaster in Azure. If this option is enabled, the LoadMaster will not boot correctly.

14. Click **Next: Advanced**.



Note: Custom data is not supported by the LoadMaster.

15. You can optionally make any necessary updates to the **Tags** section or leave the defaults.



16. Click **Next: Review + create**.
17. You can optionally click **Download a template for automation** to download an ARM template.



18. Click **Create**.

Note: If you chose to create a new SSH key pair, you are now prompted to store the private key for the public key you created. Azure does not store the private key. After the SSH key is created, you will not be able to download the private key.

The creation of a VM may take a few minutes or more depending on the Azure portal's responsiveness and other factors. Ensure that the VM is created without any errors. Resolve any errors if needed.

When creating connected VMs, ensure to select the same **Virtual network** as the LoadMaster.

Contents

- Enable a 10 Gb Interface (Optional)
- Create an SSH Key Pair

Enable a 10 Gb Interface (Optional)

Follow one of the two procedures below depending on whether you are adding a single network interface or multiple network interfaces to the LoadMaster.

To enable 10 Gb throughput for a LoadMaster virtual machine (VM) in Azure, you must select an Azure VM instance type that supports the 10 Gb Mellanox driver. Accelerated Networking is supported on most general purpose and compute-optimized instance sizes with two or more vCPUs. These supported series are: D/DSv2 and F/Fs. On instances that support hyperthreading, Accelerated Networking is supported on VM instances with four or more vCPUs. Supported series are: D/Dsv3, E/Esv3, Fsv2, Lsv2, Ms/Mms and Ms/Mmsv2. Refer to the Sizes for Linux virtual machines in Azure page for further details.

Add a Single Interface to the LoadMaster

To enable 10 Gb interfaces on the LoadMaster, perform the following steps:

1. Deploy the LoadMaster.

   Note: When you instantiate a 10 Gb interface, it appears as two interfaces in the LoadMaster Web User Interface (WUI). The two interfaces are related and have the same MAC address. Only the first interface has an IP address. If you want to modify the interface, you must do this on the interface that has the IP address listed.

   Note: For the purposes of this document, the Standard DSv2 machine size is used.

2. License and log into the LoadMaster.
3. Navigate to **System Configuration > System Administration > System Reboot**.
4. Click **Shutdown**.
5. In the Azure Portal, navigate to the LoadMaster Virtual Machine and click **Stop**.
6. In the Azure Portal, navigate to the Network Interface associated with the LoadMaster Virtual Machine.
7. Click **Edit accelerated networking**.
8. Click **Enabled** and select the validation box.
9. Click **Save**.
10. In the Azure Portal, navigate back to the LoadMaster Virtual Machine and click **Start**.
11. Log into the LoadMaster and verify that the Mellanox driver has instantiated correctly by performing the following steps:
    1. If the LoadMaster was deployed with a single interface, two interfaces are displayed under **System Configuration > Interfaces** on the LoadMaster WUI. If only one interface is displayed this means that the Mellanox driver has not instantiated.

```
eth0      Link encap:Ethernet  HWaddr 00:0d:3a:8d:4b:fe
          inet addr:192.168.1.4  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::20d:3aff:fe8d:4bfe/64 Scope:Link
          UP BROADCAST NOTRAILERS RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1143 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1705 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:538178 (538.1 KB)  TX bytes:1254819 (1.2 MB)

eth1      Link encap:Ethernet  HWaddr 00:0d:3a:8d:4b:fe
          UP BROADCAST NOTRAILERS RUNNING SLAVE MULTICAST  MTU:1500  Metric:1
          RX packets:941 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1713 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:459351 (459.3 KB)  TX bytes:1262421 (1.2 MB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:1500  Metric:1
          RX packets:1520 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1520 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1100982 (1.1 MB)  TX bytes:1100982 (1.1 MB)
```

2. You can also verify that two interfaces are active by checking performing an Ifconfig. To perform an Ifconfig, navigate to **System Configuration > Troubleshooting**. On the **Troubleshooting** screen, click **Ifconfig**. This displays two interfaces with the same hardware address.

Add Multiple Interfaces to the LoadMaster

The Azure WUI does not allow interfaces with accelerated networking to be added. You must add the interface by using the Azure command line interface (CLI) or by using PowerShell.

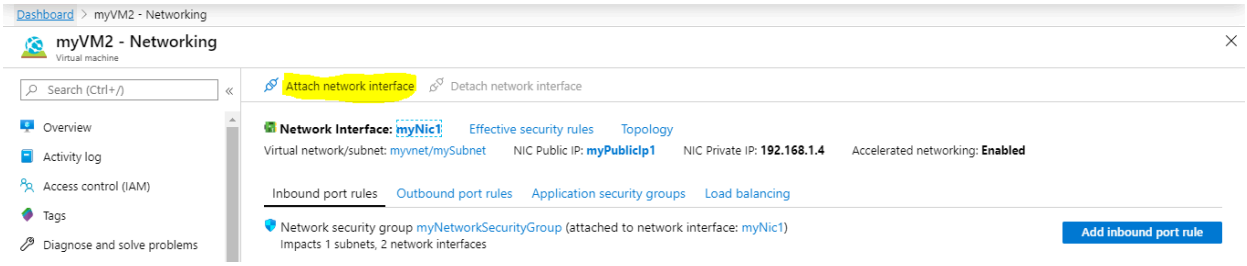
Note: You must run the command with the LoadMaster in a powered off state.

---

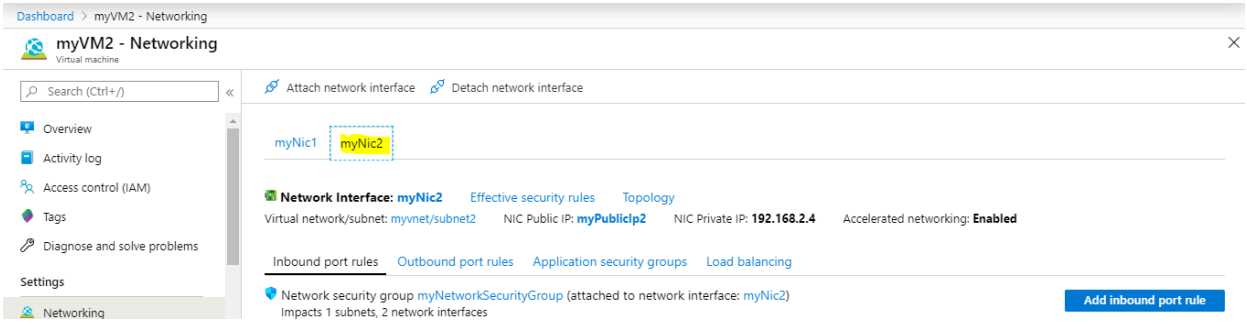
1. Create the interface using the Azure CLI similarly to the example below:

```
PS C:\Users\test> az network nic create --resource-group testdoc --name
myNic2 --vnet-name myVnet --subnet subnet2 --accelerated-networking true --
public-ip-address myPublicIp2 --network-security-group myNetworkSecurityGroup
--location eastus
```

2. When the interface is created, you can add this interface to the LoadMaster when it is in a powered off state. Navigate to the **Networking** tab of the LoadMaster on the Azure WUI.



3. Click **Attach network interface**.



4. When the attachment is complete, both interfaces appear on the Azure WUI.
5. Restart the LoadMaster.
6. Verify that the interfaces are displayed under **System Configuration > Interfaces** on the LoadMaster WUI. The LoadMaster WUI should now display four interfaces.

You can also verify that four interfaces are active by checking performing an Ifconfig. To perform an Ifconfig, navigate to **System Configuration > Troubleshooting**. On the **Troubleshooting** screen, click **Ifconfig**.

```
eth0      Link encap:Ethernet  HWaddr 00:0d:3a:8d:4b:fe
          inet addr:192.168.1.4  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::20d:3aff:fe8d:4bfe/64 Scope:Link
          UP BROADCAST NOTRAILERS RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1102 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1641 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:407988 (407.9 KB)  TX bytes:1246784 (1.2 MB)

eth1      Link encap:Ethernet  HWaddr 00:0d:3a:8c:3e:81
          inet addr:192.168.2.4  Bcast:192.168.2.255  Mask:255.255.255.0
          inet6 addr: fe80::20d:3aff:fe8c:3e81/64 Scope:Link
          UP BROADCAST NOTRAILERS RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:68 errors:0 dropped:0 overruns:0 frame:0
          TX packets:27 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:8147 (8.1 KB)  TX bytes:4702 (4.7 KB)

eth2      Link encap:Ethernet  HWaddr 00:0d:3a:8d:4b:fe
          UP BROADCAST NOTRAILERS RUNNING SLAVE MULTICAST  MTU:1500  Metric:1
          RX packets:864 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1648 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:344516 (344.5 KB)  TX bytes:1254164 (1.2 MB)

eth3      Link encap:Ethernet  HWaddr 00:0d:3a:8c:3e:81
          UP BROADCAST NOTRAILERS RUNNING SLAVE MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:15 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:3256 (3.2 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:1500  Metric:1
          RX packets:1575 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1575 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1084369 (1.0 MB)  TX bytes:1084369 (1.0 MB)
```

Unlike the single interface case where **eth0** and **eth1** are related, for multiple interfaces, **eth0** and **eth2** and **eth1** and **eth3** are related (with the same MAC address). **eth0** and **eth1** have the IP addresses, the other interfaces without the IP addresses are related by the **HWaddr** (the MAC address).

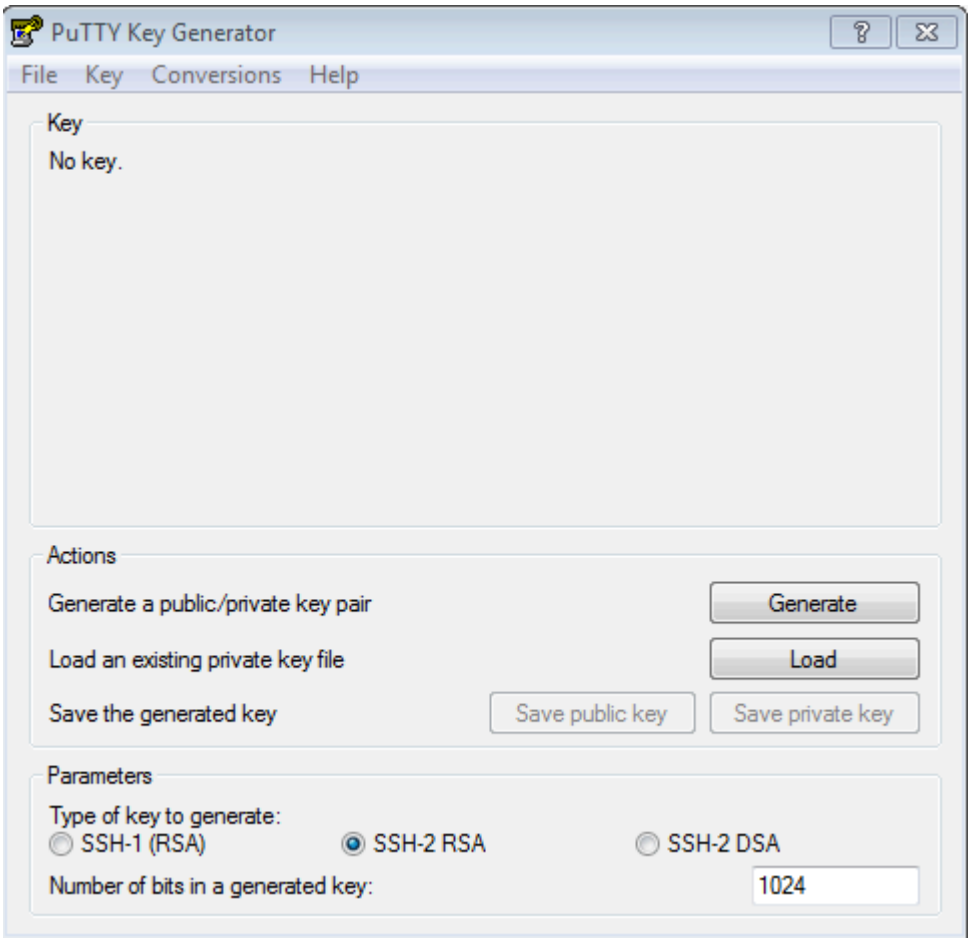
Create an SSH Key Pair

When creating a LoadMaster in Azure Government VM, there are two options for authentication - a password or an SSH public key. Kemp recommends using a password, but either way will work fine. If you choose to use a password, this section can be skipped and you can move on to the Licensing Options section to create the LoadMaster in Azure Government VM. If you choose to use an SSH public key, an SSH key pair will need to be created.

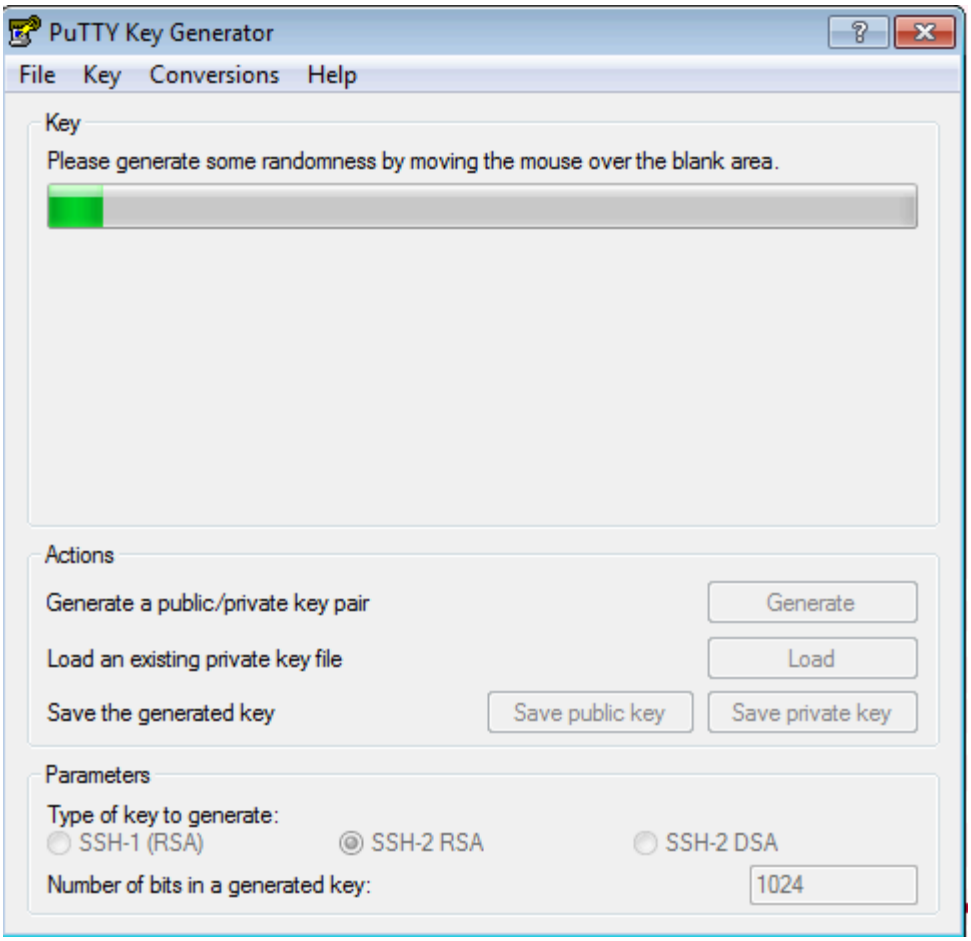
To create an SSH key pair, you will need to use a program such as the **PuTTYgen** or **OpenSSH**. As an

example for this document, the steps in **PuTTYgen** are below:

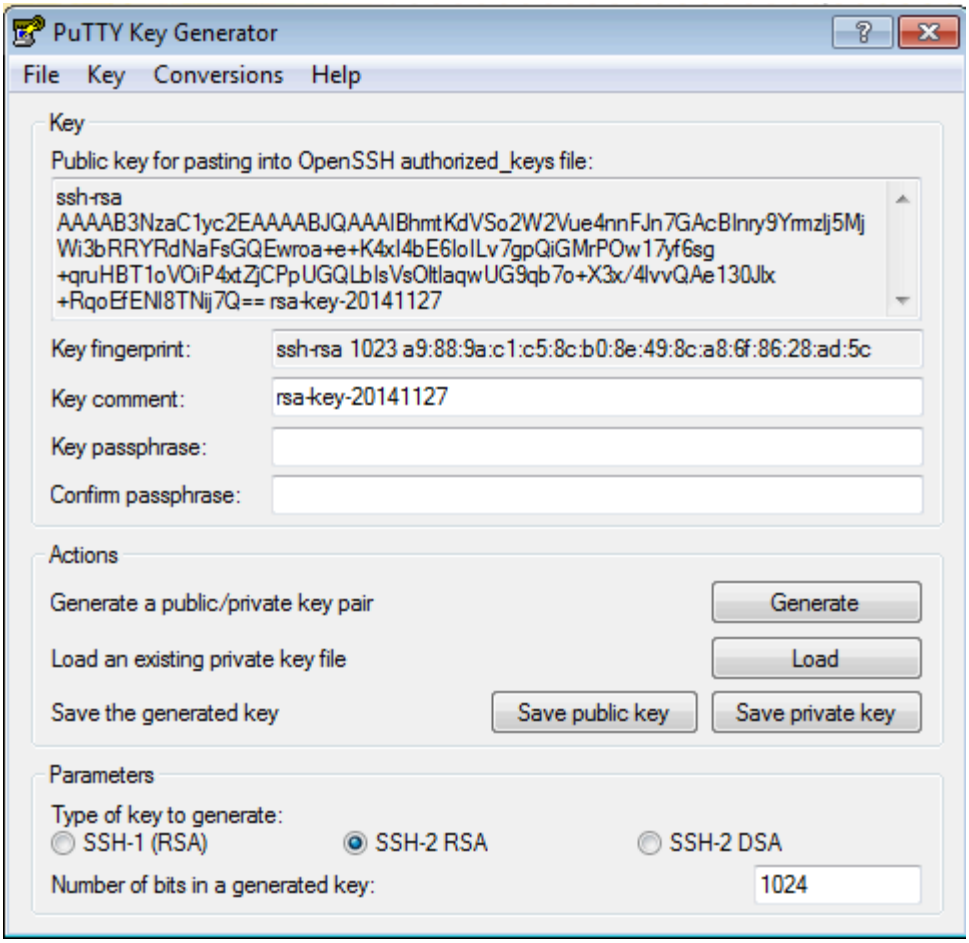
1. Open PuTTYgen.



2. Click **Generate**.



3. Move the mouse over the blank area in the middle. This generates a random pattern that is used to generate the key pair.



4. Copy and save the public and private key as needed.

Note: It is recommended to store SSH keys in a secure location.

Licensing and Initial Configuration

The following procedure outlines how to set up LoadMaster in Azure Government by ensuring appropriate licensing and basic configuration before you can create a Virtual Service and publish the required workloads:

1. Using a supported web browser, navigate to **https://<DNSName>:8443**.

   Note: Substitute <DNSName> with the DNS name you created in previous section.

2. Take the appropriate steps to acknowledge notification about the self-signed certificate to proceed.
3. You are presented with the End User License Agreement (EULA). You must accept the EULA to proceed further. Click **Agree** to accept the EULA.
4. You are prompted to enter your Progress ID and password for licensing. If you do not have a Progress ID, click the link to create one. Click **License Now**.
5. When licensing a BYOL LoadMaster, a list of available licenses is provided and/or a temporary trial license. Select the desired license and click **Continue**.

Note: When licensing a trial, you are presented with a VLM-MAX Enterprise Plus subscription.

6. The LoadMaster requires you to log in before you can proceed any further. The password used to log in will vary depending on whether you choose to use **Password** authentication or **SSH Public Key** authentication when creating the VM in the Licensing Options section:
   1. **Password:** Provide the username **bal** and the password which was set in the Licensing Options section. Click **Continue**.
   2. **SSH Public Key:** Provide the default username **bal** and password **1fourall** to proceed. You are required to change the default password soon after. Click **Continue**.
7. You are then presented with the main menu and home screen of the LoadMaster.
8. Before using the LoadMaster, it must be licensed. For instructions on how to license the LoadMaster, refer to the LoadMaster Licensing Feature Description.
9. After licensing, you are given the opportunity to enable Kemp Analytics. With this feature, LoadMaster collects and sends usage data to Progress Kemp for analysis. This data is strictly about product usage, enabled capabilities, and statistics. No sensitive user data, or traffic of any kind is either collected or communicated. To enable this feature, click **Enable Kemp Analytics**. To proceed without enabling this feature, click **Don't Enable Kemp Analytics**. For more information, visit https://kemp.ax/KempAnalytics.

Before you can create Virtual Services, you should create VMs that you are load balancing through LoadMaster in Azure Government. Ensure that your Network Security Group (NSG) is set up correctly depending on which services you are load balancing. For instructions on how to create Virtual Services, refer to the Virtual Services and Templates Feature Description.

4

Best Practices for Backups

Hypervisor snapshots cannot be used to restore a LoadMaster to a working state. The best way to back up your LoadMaster settings is by using the native backup and restore facility in the LoadMaster WUI or API.

To back up your LoadMaster configuration, follow these steps:

1. In the main menu, go to **System Configuration > System Administration > Backup/Restore**.
2. Click **Create Backup File**.

You can create a remote host for automated backups using SCP to save backups to a remote server.

For further details on backing up and restoring the LoadMaster configuration, including certificates and cipher sets, refer to the following links:

- Backup and Restore Technical Note
- How to Create and Restore a LoadMaster Configuration or Certificate Backup

5

Change the 'bal' User Password using the Serial Console

The default administrator user for the LoadMaster is called **bal**. You can change the **bal** user password using the serial console in **Local Administration > Set Password**. If you know the current password, enter it along with the new password to change the password.

Note: You can only change the password in this way if you are using the current password (you cannot change the password using an SSH key).

If you do not know the **bal** password, you can reset it by following these steps:

1. Log in using **pwreset** as the username and **1pwreset** as the password. This resets the password to the default value (**1fourall**).

   Note: Logging in using **pwreset** only works if the LoadMaster is licensed. This does not work on newly deployed units that are unlicensed.

   Note: This default password is only valid for the console. The old **bal** password for the WUI is still valid at this point and the password only gets updated after completing the steps below. If the LoadMaster is rebooted at this point, the default password of **1fourall** no longer works, so you would need to log in with **pwreset** and **1pwreset** again to reset the password to the default password of **1fourall**.

2. Log in using the **bal** username **1fourall** password.
3. Then, go to **Local Administration > Set Password**.
4. Enter the current password (**1fourall**) and the new password.

6

References

While the instructions above provide a basic overview of how to deploy and configure LoadMaster for Azure, it is not designed to be a comprehensive guide to configure every possible workload. This section identifies some of many guides published on our resources section of our website. Other useful documents are as follows:

Progress Kemp LoadMaster Product Overview

Web User Interface (WUI) Configuration Guide

CLI Interface Description

RESTful API Documentation

Virtual Services and Templates Feature Description

SubVSs Feature Description

SSL Accelerated Services Feature Description

Port Following Feature Description

Content Rules Feature Description

Edge Security Pack (ESP) Feature Description

Quick Start Guide

LoadMaster HA for Azure Installation Guide

LoadMaster Licensing Feature Description

You can find more documentation here: https://docs.progress.com/

You can engage in community discussions on forums at the LoadMaster Support and Learning Hub