

Morgan Combstock

by Morgan Combstock

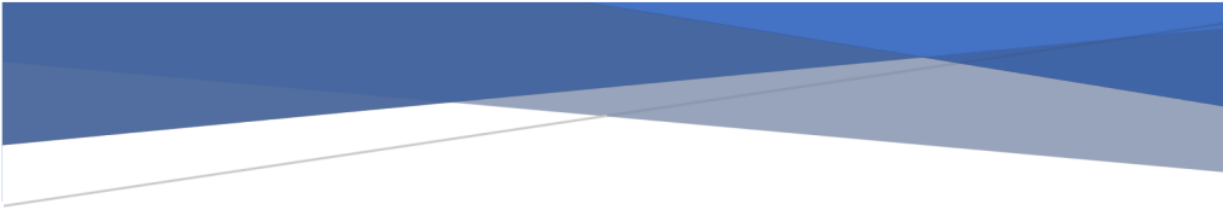
Submission date: 09-Jan-2023 10:31PM (UTC+0000)

Submission ID: 194255864

File name: 24982_Morgan_Combstock_Morgan_Combstock_460444_1673478949.docx (133.09K)

Word count: 1089

Character count: 5302



ACCA5025

Morgan Combstock
2014028

Contents

Table of Figures..... 1

Introduction 2

Virtual Machines (VMs)..... 2

 Virtual Networks (vNets) and Network Security Groups (NSGs) 3

 VM Images 4

Additional Exercise..... 5

References 6

Table of Figures

Figure 1 - Resource Group Creation Command 2

Figure 2 - Virtual Machine Creation 2

Figure 3 - vNet and VM Creation 3

Figure 4 - VMs on a Virtual Network..... 3

Figure 5 - Generalizing a VM to use as an Image..... 4

Figure 6 - Creation of a New VM based on Custom Image 5

Figure 7 - Install Nginx on new VM 5

Introduction

This report will look at how virtual machines are created and managed in Microsoft Azure. It will also discuss the related resources that are required and provide samples of how this can be done using the Azure command line interface.

Virtual Machines (VMs)

A virtual machine is an entirely virtual computer. As such, it requires similar resources to a physical machine such as an operating system, network interface cards and a hard drive. The following will be focussed on virtual machines in Microsoft Azure. In other services, the principles are the same but may differ in smaller details.

The first requirement for a VM is a resource group. A resource group is a container that holds related resources for an Azure solution [1]. Figure 1 shows the command to be executed to create a resource group.

```
az group create --name myvm-resource-gp
```

Figure 1 - Resource Group Creation Command

Once the resource group has been created, the virtual machine can be provisioned. This can be done either by using the Azure Virtual Machine Wizard which is a more user friendly interface or the command line. For the entirety of this report, all resources will be created using the command line.

A virtual machine can be created using the command shown in figure 2.

```
az vm create --resource-group myvm-resource-gp --name myVM --image UbuntuLTS --admin-username azureuser --generate-ssh-keys
```

Figure 2 - Virtual Machine Creation

As a minimum, I have specified the image and the admin username. There are many other inputs that could be included such as NICs, NSGs and assigning data or OS disks. As I did not specify a vNet, public IP address, NIC or disk, Azure automatically creates these resources in the background as they are required to run the VM. The alternative would be to create the vNet in advance of the VM and then assign it to the VM at creation stage.

While Azure has automatically

Figure 3 shows the creation of a vNet and then assigning it to a newly created VM, myVM2.

```
az network vnet create --resource-group myvm-resource-gp --name myVnet  
  
az vm create --resource-group myvm-resource-gp --name myVM2
```

Figure 3 - vNet and VM Creation

Virtual Networks (vNets) and Network Security Groups (NSGs)

Virtual Networks or vNets allow resources on the network, such as VMs, to communicate with one another and also to connect to the internet or other on-premise networks [2]. VMs do this by using network interface cards or NICs. An example of this can be seen in Figure 4.

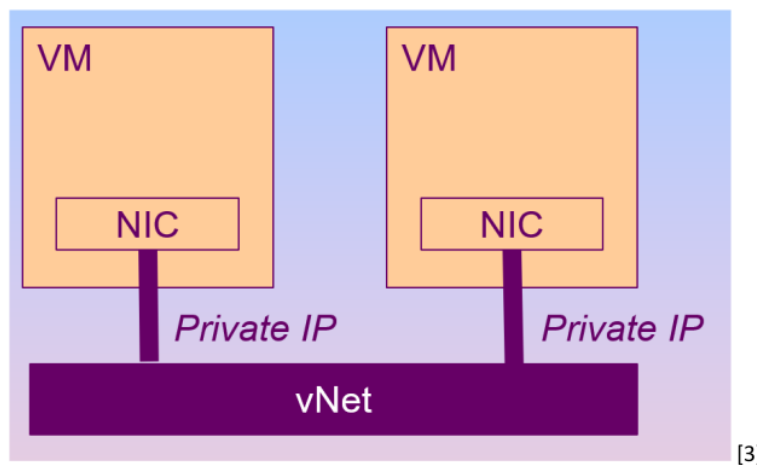


Figure 4 - VMs on a Virtual Network

VMs require at least one NIC to connect to a vNet but could have more. A VM could connect to multiple vNets if it had more than one NIC. A vNet can also be divided into multiple subnets. A subnet is a subdivision of IP addresses within the virtual network. Subnets are used to manage many VMs in large organisations and can also create efficiencies when VMs that need to interact are on the same subnet as no traffic needs to go any further than the localised subnet.

Access to VMs, can be managed by assigning a Network Security Group or NSG to a VMs NIC or to the subnet. An NSG is made up of security rules which define allowable traffic. For example, all inbound traffic could be blocked, all outbound traffic could be allowed or specific ports could be opened to allow access to certain resources.

VM Images

A VM image is a configured template to create a VM from. This could be very generic or highly configured for specific applications. Images can be built based on a current VM build.

Figure 5 below shows the steps that need to be taken to generalize a VM and create an image from it. In this example, the image is very basic as no additional software has been downloaded to the VM before it is generalized.

```
morgan [ ~ ]$  
az vm list-ip-addresses --name myVM  
  
ssh azureuser@20.117.150.50  
  
azureuser@myVM  
sudo waagent -deprovision+azureuser --yes  
  
exit  
  
morgan [ ~ ]$  
az vm deallocate --resource-group myvm-resource-gp --name myVM  
  
az vm generalize --resource-group myvm-resource-gp --name myVM  
  
az image create --resource-group myvm-resource-gp --name myImage  
--source myVM
```

Figure 5 - Generalizing a VM to use as an Image

Using the image I have created above, I can then create a VM based on that image. This means I would not need to install any software that the image already contained. In my example, no software was installed however, things like nginx and PostgreSQL could be included. This allows resources to be provisioned at scale based on the template meaning minimal manual intervention. A VM can be created from the image as shown in Figure 6 below.

```
az vm create -g myvm-resource-gp -n myVM --image myImage --admin-username azureuser --generate-ssh-keys
```

Figure 6 - Creation of a New VM based on Custom Image

Additional Exercise

The first step for this is to create a VM and install Nginx. Figure 7 below shows the steps taken to achieve this.

```
morgan [ ~ ]$  
ssh azureuser@20.117.98.218  
  
azureuser@myVM  
sudo apt update  
  
sudo apt install nginx  
  
exit
```

Figure 7 - Install Nginx on new VM

Once installed, a second VM needs to be set up and have PostgreSQL installed.

Making a note of the Public IP address for the PostgreSQL VM, we can then open port 80 on the VM which allows incoming traffic. Using the noted public IP address, the Nginx VM is then able to read data that is saved on the PostgreSQL database VM.

References

- [1] Microsoft Learn, "Manage Azure resource groups by using the Azure portal," Microsoft, 02 03 2022. [Online]. Available: <https://learn.microsoft.com/en-us/azure/azure-resource-manager/management/manage-resource-groups-portal>. [Accessed 05 01 2023].
- [2] Microsoft Learn, "What is Azure Virtual Network?," Microsoft, 27 10 2022. [Online]. Available: <https://learn.microsoft.com/en-us/azure/virtual-network/virtual-networks-overview>. [Accessed 05 01 2023].
- [3] M. Dacey, "Azure Virtual Machines (VMs)," UWTSD, Swansea, 2022.

FINAL GRADE

60/100

GENERAL COMMENTS

Instructor

VM Resources (40): 33

VM Images (35): 23

Config Exercise (20): 4

Demo (5): 0

Feedback:

=====

I would have liked a little more detail on the components of a VM, but you have provided examples.

Again you could have provided more discussion of images e.g. what do we mean by image and why does it have to be generatlised?

I do not see any evidence that you completed the config but you have outlined some initial steps.

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7
