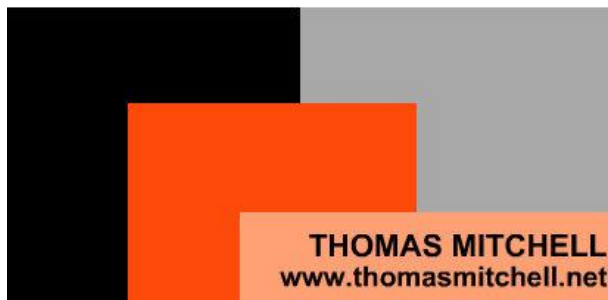# CREATING AND MANAGING AZURE DATA DISKS WITH AZURE POWERSHELL
AN AZURE DISK PRIMER

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CEATING AND MANAGING AZURE DATA DISKS WITH AZURE POWERSHELL

Learn how to provision data disks in Azure and how to attach them to virtual machines, using PowerShell.

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ABOUT THE AUTHOR

Hello. My name is Tom Mitchell. I am a 20+ year veteran of the IT industry. I own and run thomasmitchell.net.

Throughout the course of such a long an interesting career, I have built a rather in-depth skill base. My skillset spans over a dozen different IT disciplines but my specialties include:

- Microsoft Exchange
- Microsoft Office 365
- Microsoft Active Directory
- Microsoft Azure
- Infrastructure Services

I have designed and architected the smallest solutions and some global solutions. I have deployed and implemented said solutions as well as supported them. My expert-level knowledge of these and other disciplines such as virtualization and storage allow me to meticulously design and efficiently implement/troubleshoot all kinds of IT solutions and infrastructures.

In addition to the coveted MCSE: Cloud Platform and Infrastructure certification, I also carry several other industry certifications, including multiple Microsoft MCSA certifications.

My superior ability to see things from a strategic perspective allows me to architect solutions that closely align with business needs. By avoiding "tunnel vision" that focuses on "now" when designing solutions, I can ensure that my solutions stand the test of time and grow with the business.

INTRODUCTION

Azure virtual machines use disks to store the operating systems, applications, and data. When creating a VM it is important to choose a disk size and configuration appropriate to the expected workload. This tutorial covers deploying and managing VM data disks.

In this tutorial, you will learn:

- The difference between OS Disks and Temporary Disks
- What Data Disks are
- The difference between Standard Disks and Premium disks
- Disk performance

- How to Create Data Disks
- How to attach a Data Disk to a virtual machine
- How to prepare a Data Disk

By the time you finish this tutorial, you will have a solid understanding of the different types of Azure disks, how to create them via PowerShell, and how to manage them via PowerShell.

DEFAULT AZURE DISKS

When an Azure virtual machine is created, two disks are automatically attached to the virtual machine. They include the Operating System Disk and a Temporary Disk.

OPERATING SYSTEM DISK

Operating system disks, which host the virtual machine's OS, can be sized up to 4 terabytes. The OS disk is assigned a drive letter of D: by default, and its disk caching configuration is optimized for OS performance. Using the OS disk to host data or applications is not recommended. For applications and data, use a data disk, which is detailed later in this article.

TEMPORARY DISK

Temporary disks use a solid-state drive that is located on the same Azure host as the VM. This temporary storage is typically used to save the system paging file but can be used to store other data that you can afford to lose. This temporary storage has no extra costs associated with it.

Temporary disks are high performance and can be used for operations such as temporary data processing. However, if the VM is moved to a new host, any data stored on the temporary disk is removed. A temporary disk's size is determined by the VM size and they are typically assigned a drive letter of D: by default.

TEMPORARY DISK SIZES

- **General Purpose:** A, B, and D Series VM 1600MB
- **Compute Optimized:** F Series VM 576MB
- **Memory Optimized:** D, E, G, and M Series VM 6144MB
- **Storage Optimized:** L Series VM 5630MB
- **GPU:** N Series VM 1440MB
- **High Performance:** A and H Series VM 2000MB

AZURE DATA DISKS

Data disks are recommended when durable and responsive data storage is required. Each data disk has a maximum size of 4TB and additional disks can be added. When installing applications and storing data, data disks should be used.

The size of the virtual machine determines how many data disks can be attached and it's the number of vCPUs that drives this.

MAX DATA DISKS PER VM

- **General Purpose:**   A, B, and D Series VM   2-64 Data Disks
- **Compute Optimized:**   F Series VM   4-64 Data Disks
- **Memory Optimized:**   D, E, G, and M Series VM   4-64 Data Disks
- **Storage Optimized:**   L Series VM   16-64 Data Disks
- **GPU:**   N Series VM   12-64 Data Disks
- **High Performance:**   A and H Series VM   32-64 Data Disks

VM DISK TYPES

Azure provides two types of disk. These include standard disks and premium disks. Standard disks are typically lower-performance and are used for general purpose storage. Premium disks are higher-performance and are used when higher-IO is required.

STANDARD DISK

Standard Storage is backed by magnetic HDD technology and delivers cost-effective storage while still providing decent performance. Standard disks are ideal for cost effective development environments.

PREMIUM DISK

Premium disks are backed by SSD technology. These low-latency disks offer high-performance storage. These disks are a good choice for production virtual machines. Premium Storage supports DS-series, DSv2-series, GS-series, and FS-series virtual machines and comes in five types: P10, P20, P30, P40, and P50.

PREMIUM DISK PERFORMANCE

The size of the disk determines the disk type. When provision a premium disk, the size is rounded up to the next type. For example, if a disk being provisioned is below 128GB

the disk type is P10. However, a disk of 200GB would be P20. The table below highlights the differences.

Type	P4	P6	P10	P20	P30	P40	P50
Size (round up)	32GB	64GB	128GB	512GB	1TB	2TB	4TB
Max IOPs	120	240	500	2300	5000	7500	7500
Throughput	25MB/s	50MB/s	100MB/s	150MB/s	200MB/s	250MB/s	250MB/s

Although the table above identifies max IOPS per disk, striping multiple data disks can achieve even higher performance.

CREATING AND ATTACHING DISKS

Creating a disk and attaching it to a virtual machine requires four steps. The first step is to create the initial disk configuration. Once the configuration is created, the actual data disk resource is created. After creating the configuration and the actual data disk, the data disk is added to the virtual machine configuration. Lastly, the virtual machine configuration is updated to include the new disk.

The exercises below demonstrate how to create a new data disk and how to add the data disk to a virtual machine. If you wish to complete these exercises, you will need a virtual machine at your disposal. Follow the instructions below to create a new virtual machine, a new data disk, and to attach the data disk to the virtual machine.

Provision a Virtual Machine

Before provisioning a virtual machine, create a username and password that will be used as the local administrator account on the virtual machine. To do so, connect to your Azure tenant via PowerShell (see instructions) and run the Get-Credential command below.

$cred = Get-Credential

When prompted, provide a username and password to use as the local admin for your virtual machine.

After creating the local admin account, create the virtual machine with New-AzureRmVm command below. Simply copy/paste it into your PowerShell session. See this video for a demonstration of how the process works.

New-AzureRmVm `

  -ResourceGroupName "VMLab" `

  -Name "myVM" `

```
        -Location "EastUS" `

        -VirtualNetworkName "myVnet" `

        -SubnetName "mySubnet" `

        -SecurityGroupName "myNSG" `

        -PublicIpAddressName "myPublicIpAddress" `

        -Credential $cred `

        -AsJob
```

Once the virtual machine has been provisioned, the data disk can be created.

Create Data Disk Configuration

Create the initial configuration with the New-AzureRmDiskConfig command. The command below configures a disk that is 128 gigabytes in size. Copy and paste it into your PowerShell session and run it.

```
$diskConfig = New-AzureRmDiskConfig `

    -Location "EastUS" `

    -CreateOption Empty `

    -DiskSizeGB 128
```

Create the Data Disk

With the data disk configuration created, create the actual data disk with the New-AzureRmDisk command below:

```
$dataDisk = New-AzureRmDisk `

    -ResourceGroupName "VMLab" `

    -DiskName "DataDisk" `

    -Disk $diskConfig
```

Add Data Disk to Virtual Machine

With the data disk created, get the virtual machine that you are adding the data disk to, by running with the Get-AzureRmVM command below. If you are using a different

resource group name or different VM name, be sure to use those in the command below, instead of "VMLab" and "myVM".

$vm = Get-AzureRmVM -ResourceGroupName "VMLab" -Name "myVM"

The command above retrieves the virtual machine configuration and loads it into a variable. You can add the data disk to the virtual machine configuration with the Add-AzureRmVMDataDisk command below.

$vm = Add-AzureRmVMDataDisk `

-VM $vm `

-Name "DataDisk" `

-CreateOption Attach `

-ManagedDiskId $dataDisk.Id `

-Lun 1

Update the Virtual Machine

With the data disk configuration added to the virtual machine configuration (using the command above), the virtual machine can be updated with the Update-AzureRmVM command below:

Update-AzureRmVM -ResourceGroupName "VMLab" -VM $vm

The command below adds the actual data disk to the virtual machine so that the OS of the virtual machine can see it.

PREPARING DATA DISKS

After attaching a data disk to a virtual machine, the disk must be configured within the operating system on the virtual machine itself. The disk must be initialized, and a partition created. The partition must then be formatted (just like any other physical disk would be).

The following exercise demonstrates how to manually configure a data disk added to a virtual machine.

MANUALLY CONFIGURING AN ATTACHED DISK

To manually configure an attached data disk on a virtual machine, simply create an RDP connection to the virtual machine and open PowerShell on it.

Copy and paste the command below into the PowerShell session and hit Enter:

Get-Disk | Where partitionstyle -eq 'raw' | `

Initialize-Disk -PartitionStyle MBR -PassThru | `

New-Partition -AssignDriveLetter -UseMaximumSize | `

Format-Volume -FileSystem NTFS -NewFileSystemLabel "DataDisk" -Confirm:$false

The command above retrieves the raw disk, using the Get-Disk command. From there, it pipes that information to the Initialize-Disk command so that the disk can be initialized within the operating system.

Once the disk is initialized, the New-Partition command creates a new partition that equals the size of the disk. Lastly, the Format-Volume command formats the new volume so that it can be accessed by the operating system.

WRAP UP

If you've performed all steps correctly, you now have a virtual machine called "MyVM", in a resource group called "VMLab". The virtual machine contains an OS disk and a new 128GB data disk as well.

As such, you can now say that you:

- Know the difference between OS Disks and Temporary Disks
- Know what Data Disks are
- Know the difference between Standard Disks and Premium disks
- Know about disk performance
- Know how to create Data Disks & attach them to a virtual machine
- Know how to prepare a Data Disk

For more in-depth technology learning, visit me at any one of my various online locations:

- Where I Blog: My Website
- Where I Teach: Udemy & Learn with Tom
- Where I Socialize: LinkedIn & Facebook
- My Free Tutorials: YouTube

Thanks for reading and happy learning!