DH2i DxEnterprise 19.5 Software:

MSSQL HA Instances for Windows on Azure

Quickstart Guide

Introduction

This quick-start guide describes how to set up and configure a MSSQL HA (FCI) with shared disk solution for DxEnterprise running in Azure. Using this guide, the user will create an availability set and virtual machines, configure Azure shared disks, and create and configure an Azure load balancer that will allow access to the resources assigned to the DxEnterprise Vhost.

Create the Availability Set and Virtual Machines

1. Login to the Azure Management Portal.
2. Search for **Availability Sets** using the top search bar, then select **Add**.
3. Assign the availability set to a resource group and give it a name.

4. Select **Review + Create** in the bottom-left corner, then select **Create**.
5. Search for **DxEnterprise** in the top search bar and select one of the DxEnterprise offers available under **Marketplace**.
6. Under Select a software plan, choose an operating system and select **Create**.
7. Configure a virtual machine template and assign it to the availability set.
   a. Assign the VM to the same resource group as the availability set and give it a name.
   b. Under Instance Details > Availability options, select **Availability set**.
   c. A new drop-down box will appear. Select the availability set created in step 4.
   d. Setup an authentication type.
   e. Under Networking, select **Create New** and set the SKU of the public IP address to standard.
      NOTE: There is an option under network settings to place the virtual machine behind an existing load balancing solution. Do not select this option.

f.   Select **Review + Create**, then **Create**.

Create a virtual machine

Basics   Disks   Networking   Management   Advanced   Tags   Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. Learn more ↗

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ	Azure subscription 1
Resource group * ⓘ	(New) dxewin_group
	Create new

Instance details

Virtual machine name * ⓘ	dxewin
Region * ⓘ	(US) West US
Availability options ⓘ	Availability set
Availability set * ⓘ	No existing availability sets in current resource group and location.
	Create new
Image * ⓘ	DxEnterprise on Windows (BYOL) - Gen1
	Browse all public and private images
Azure Spot instance ⓘ	◯ Yes ⦿ No
Size * ⓘ	Standard_B2s - 2 vcpus, 4 GiB memory ($42.05/month)
	Select size

Administrator account

Username * ⓘ	
	❌ The value must not be empty.
	❌ The value must be between 1 and 20 characters long.
Password * ⓘ	
	❌ The value must not be empty.
	❌ The value must be between 12 and 123 characters long.
Confirm password * ⓘ	

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

| Public inbound ports * ⓘ	◯ None ⦿ Allow selected ports
Select inbound ports *	RDP (3389)

⚠ **This will allow all IP addresses to access your virtual machine.** This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

8.   Repeat steps 7a-f for additional VM(s).
9.   The availability set has been created with VMs assigned to it. Return to the Azure homepage by selecting **Microsoft Azure** in the top-left corner.

Configure DxEnterprise

To enable and start DxEnterprise services, click on the Setup shortcut on the desktop.

Right-clicking the DxAdmin icon on the Windows desktop and executing as Administrator will display the following login dialog. Select the target server; the default name is **localhost** on port 7979. To specify a different port, append it to the target server name using a colon (:). The server name can also be written as **localhost:7979**.
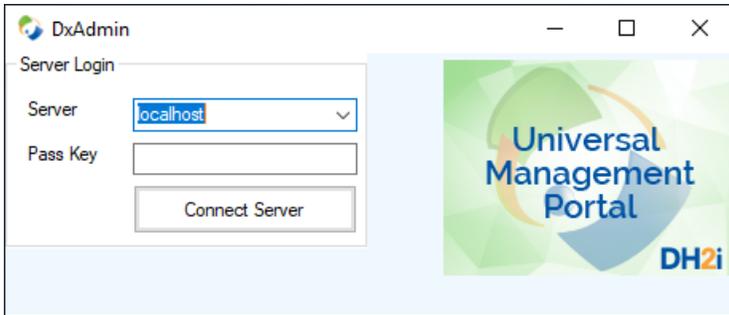
On initial setup, there are three options to choose from.
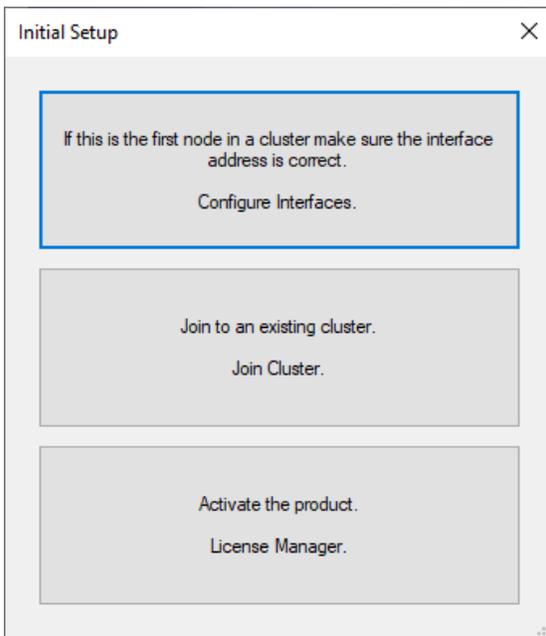
1. **Configure Interface** – The following dialog displays the currently configured interface.
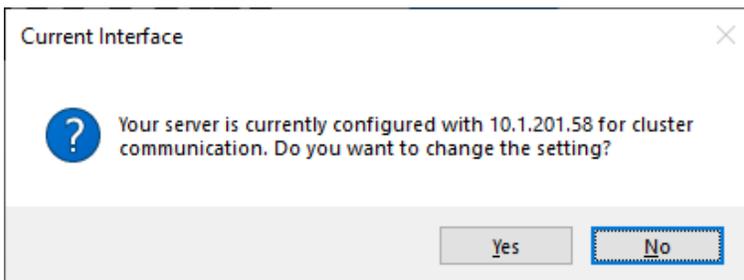

If the user selects *no*, the displayed settings are used for the initial interface; if the user selects *yes*, the following dialog is displayed. This dialog allows the user to select different interfaces and protocols for cluster communication.
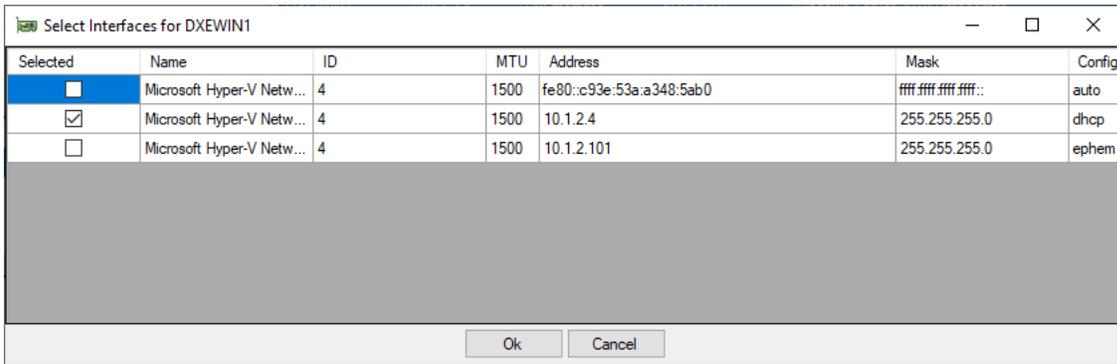
2. DxAdmin will show the node has been added.
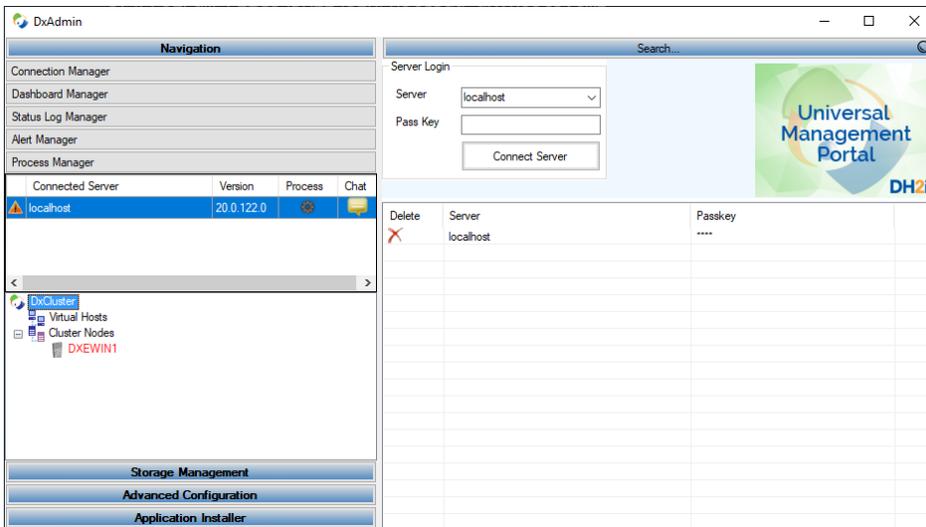
3. To activate the license, click on Advanced Configuration and select Cluster Membership.
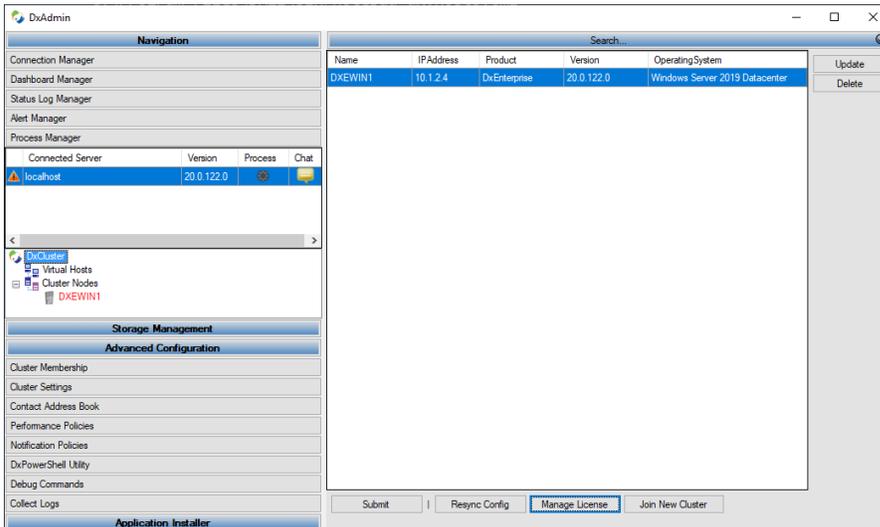
4. **Activate the Product** – The following form is displayed so the user can view, activate, or reactivate any cluster nodes.

Node Name

Each node in the cluster will appear in its own row displaying the activation status of that node.

License Key

The license key used to activate the product.

Product

The DH2i product that corresponds to the license.

Clients

The number of active remote clients allowed to connect to each server.

Expiration Date

The last date the product can be used.

Support Date

The expiration of the support contract. The product may be used until the expiration date, but the ability to request customer service and receive new updates stops on the support date.
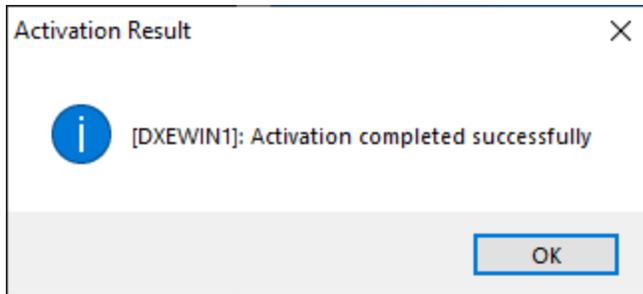
Is Valid

If the license is active, this column will be checked. If not, select the node using the checkbox on the left side and click **Activate**.

Activate

Click to activate the selected servers. The **Accept EULA** checkbox must also be selected.

5. The successful activation window will appear.

Install Microsoft SQL Server

To install Microsoft SQL Server on Windows, please see the below link from Microsoft Docs, select the correct operating system and follow the steps.

- [Installation guidance for SQL Server on Windows](#)

Configure Storage

Present Storage

Note: Please ensure proper presentation of storage to nodes. If there is storage that is not managed by this DxEnterprise cluster presented to the nodes, it is possible to overwrite or corrupt the data held on that storage.

DxEnterprise supports any storage that is SCSI-3 Persistent Reservation compliant. The below examples are specific to the Azure shared disk feature.

Create and configure Azure shared disk

On July 16, 2020, Microsoft announced the general availability of Azure shared disks. Azure shared disk is the industry's first shared block storage in the cloud. Azure shared disks are available both on Ultra Disks and Premium SSDs.

Note: there are various limitations for Azure disks that can be used as shared disks. For example, the VMs and the disks must be residing in the same Availability Zone for regions that support Availability Zone/Set, or Proximity Placement Groups. Thus, it's important to provision appropriately as they cannot be changed after the creation.

Before an Azure shared disk can be used, the VMs must have its Ultra disk feature enabled. From the Azure Portal, go to the Disk property of the VM and enable the Ultra Disk Compatibility.
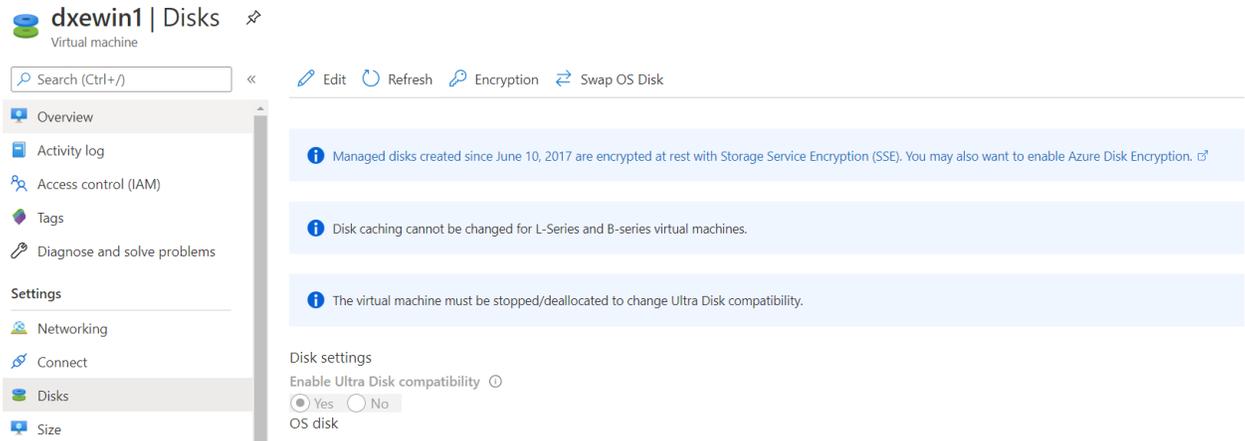
Ultra disk feature can also be enabled via Azure CLI:

- az vm update -g <resource_group> -n <vm_name> --set additionalCapabilities.ultraSSDEnabled=1

To deploy an Azure disk (e.g. Ultra disk) as shared disk that is shareable across multiple VMs, specify the maxShare parameter to a value greater than 1.

- az disk create -g <resource_group> -n <disk_name> --size-gb <desired_size> -l <location> --sku UltraSSD_LRS --max-shares <number_of_VMs_sharing>

Once the shared disk is created with maxShare>1, it can be attached to the VMs via Azure CLI:

- az vm disk attach --resource-group <resource_group> --vm-name <vm_name> --name <disk_name>

Manage the Disk(s)

DxEnterprise leverages native file system (NTFS/ext4/xfs) and shared storage technology to coordinate access to a pool of disk resources in the cluster. Managing a disk puts that disk under DxEnterprise control.
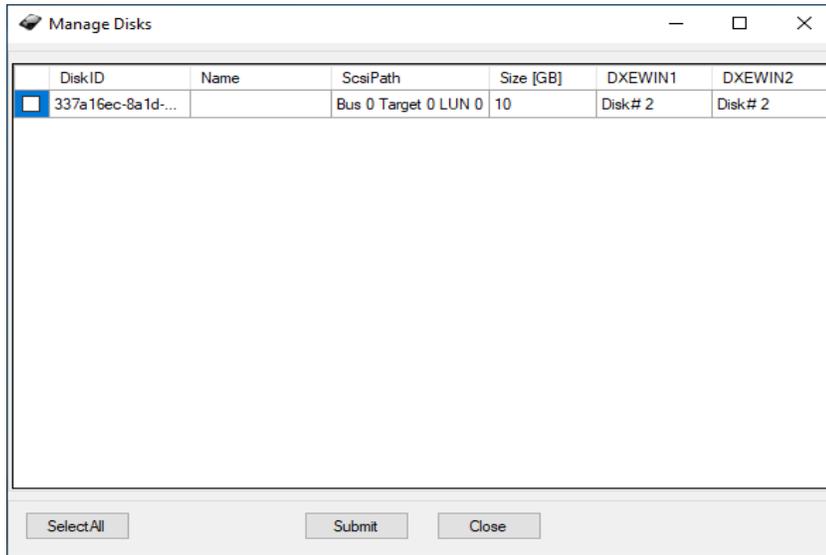
Access DxEnterprise Storage Manager, from the DxAdmin main menu, select **Storage Management** and select a node.
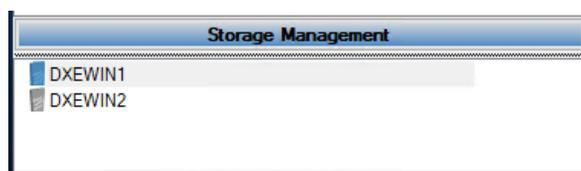
To manage disk(s), right-click on a disk and select **Manage**.
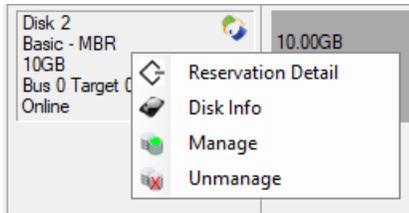
The *Manage Disks* window then appears.

Select the desired disk(s) to be managed by DxEnterprise. A custom name can be defined for each managed disk by entering the value in the **Name** text field. Click **Submit** to commit the changes. Click **Close** to cancel the operation without making changes.

Create a Volume

DxEnterprise allows a volume to be created from any empty space available on a disk. To create a volume, right-click on an empty partition and select **Create Volume**.
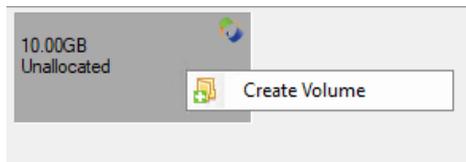
The *Specify Volume Size* window then appears.
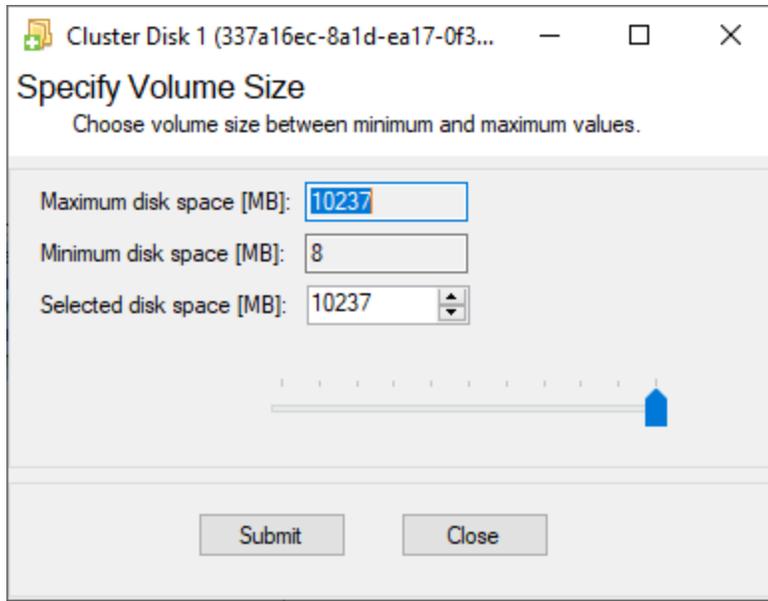
Maximum disk space

The current maximum free space on disk in [MB].

Minimum disk space

The minimum disk space for the new volume in [MB]. The default value is 8 MB.

Selected disk space

The chosen size for the new volume in [MB]. Either enter the desired value in the text field or use the up & down arrows or the slide bar to pick the desired value.
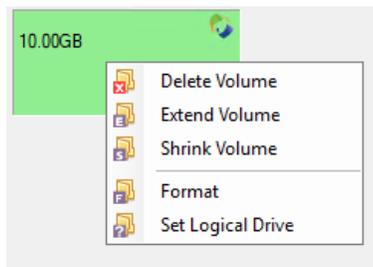
Submit

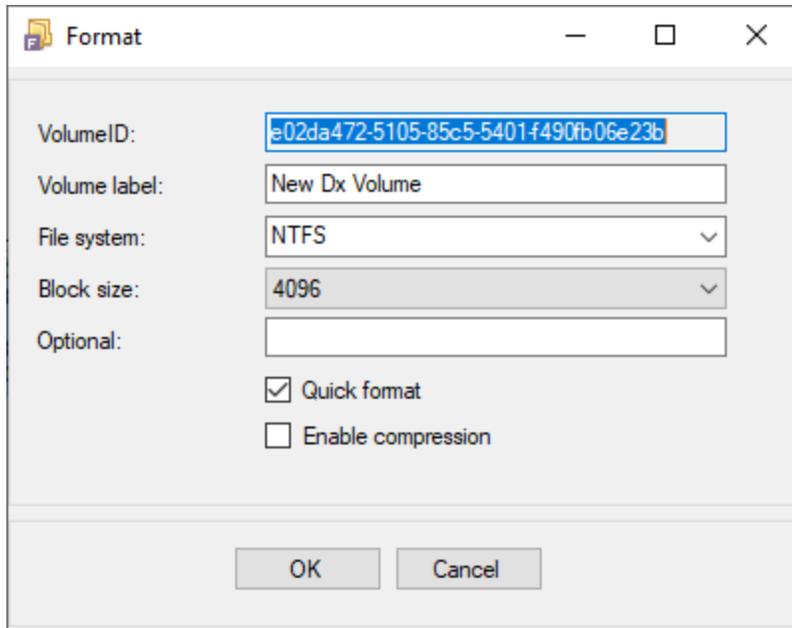Click to commit the changes.

Close

Click to cancel the process without making any changes.

Format the Volume

Before a volume is usable, it needs to be formatted with NTFS. To (re)format a volume, right-click on a volume and select **Format**.

The *Format* window then appears.

VolumeID

> The unique volume ID. The field is read-only.

Volume label

> The user-defined label for the volume. Default value is "New Dx Volume".

File system

> The file system type for which the volume should be formatted. Default value is NTFS on Windows and ext4 on Linux.

Block size

> The user-defined block size for the volume. Default value is 4096.

Optional

> Optional flags available to Windows format.
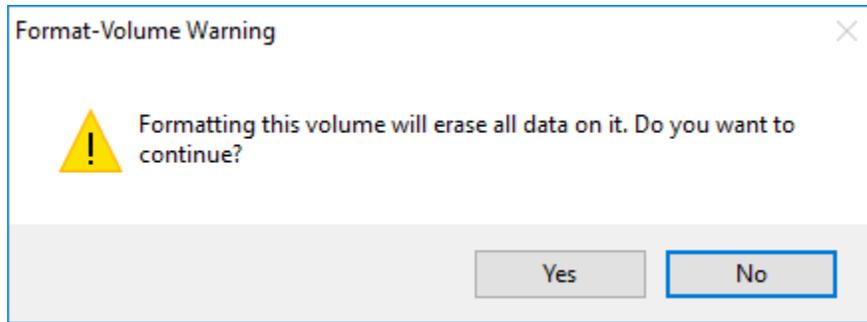
Quick format

> Check to use quick format. Quick format does not fill the data on the volume with zeroes (0), but the operation takes less time to complete.

Enable compression

> Check to enable compression support for the volume.

OK

> Click to start the format. A warning of the operation then appears. Click **Yes** to format or **No** to cancel.

Cancel

Click to cancel the process without making any changes.

Assign a Mount Point for the Volume

DxEnterprise supports both a logical drive letter and one or more mountpoints for a volume. If the empty folder(s) for the mountpoint(s) do(es) not exist when the node becomes active, DxEnterprise will ensure the folder(s) is/are created on the fly and the mountpoints are properly set. Administrators do not need to pre-create the empty folder(s) for the mountpoints on each node participating in the cluster.

To specify the logical drive letter or mountpoints, right-click on a volume and select **Set Logical Drive**.
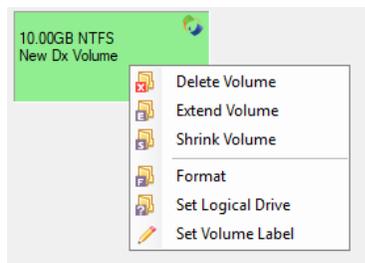
The *Logical Paths* window then appears.
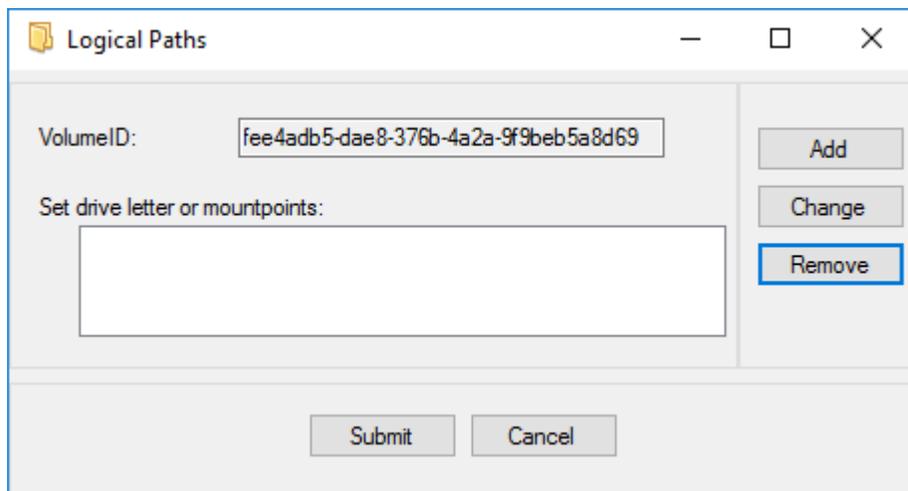
VolumeID

The unique volume ID. The field is read-only.

Set drive letter or mountpoints

Current list of drive letter and mountpoints to be set for the volume.

Add

Click to add a drive letter or mountpoint to the list. When clicked, the *Add new drive letter or mountpoint* window appears. Please note that there can only be one drive letter assigned per volume. If a drive letter is assigned to any other volume, the drive letter will no longer be available for assignment to additional volumes. Drive letter assignment is available and applicable on Windows only.
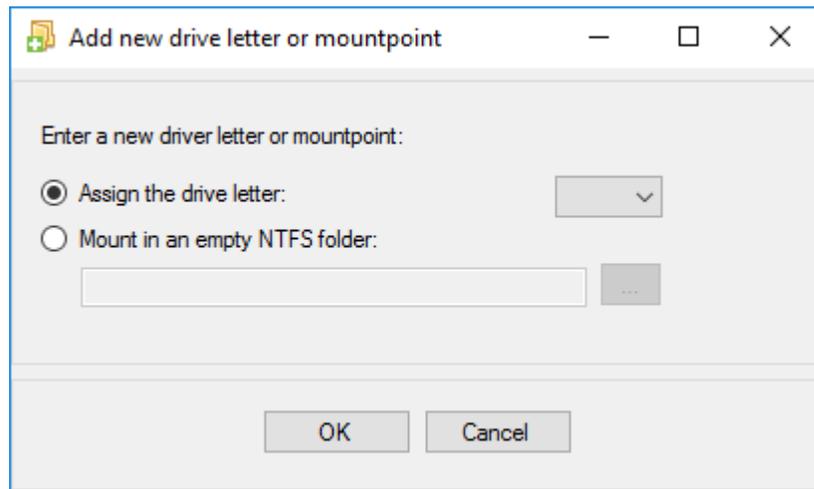
Change

Click to change the drive letter assignment. When clicked the *Change drive letter* window appears. Drive letter assignment is available and applicable on Windows only. Changing a mountpoint is not supported.
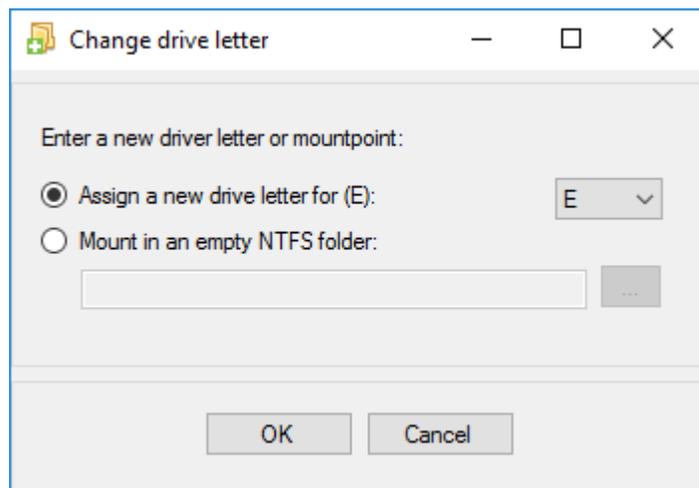
Remove

Click to remove the drive letter or mountpoint assignment for the volume.

Submit

Click to set the drive letter and mountpoints for the volume. A warning dialog for the operation then appears. Click **Yes** to assign the mountpoints or **No** to cancel.

Cancel

Click to cancel the process without making any changes.

Create a Vhost

DxEnterprise uses Virtual Hosts (Vhosts) to provide failover support and high availability. A Vhost virtualizes the network name and IP address associated to a particular SQL Server Instance, file share, and/or service. Instead of using the network name and IP address of a physical server, a Vhost is created and assigned a unique name/virtual IP-address pair. Clients access the databases associated with an instance via the Vhost name or IP address; they do not need to know which node is running the SQL instance. When a Vhost is configured, the user will need to specify at least one node to participate in the Vhost. It is recommended to create A and PTR records for each Vhost in DNS for resolution as well as add Vhost entries to each node's local hosts file.

To create a Vhost, right-click on **Virtual Hosts** from the DxAdmin explorer tree and select **Add a virtual host**. The *Vhost Properties* window then appears.

Virtual Host Name

Use this field to specify a Vhost name. Make sure the Vhost/IP-address pair is registered in DNS. The name entered in this field cannot include spaces.

Virtual IPs

Specify the IP address(es) that will be associated with this Vhost. Prefix by an asterisk (*) for existing address. Multiple virtual IP addresses can be specified for a Vhost, delimited by a comma.

There are three types of networking topologies supported by DxEnterprise:
   a. A Vhost with a virtual IP that can be bound to either side of the DR (e.g**. Source: 10.1.200.100/8, Target: 10.2.200.100/8, VIP: 10.3.200.100/8**). This topology is ideal for network that has VLAN stretched across both sites.
   b. A Vhost with two virtual IPs that each VIP can be bound to one side of DR only (e.g. **Source: 10.1.200.100/24, Target: 10.2.200.100/24, VIP: 10.1.200.111/24, 10.2.200.111/24**). This topology is ideal for network without VLAN stretched across sites.
   c. A Vhost with no virtual IP (e.g. **Source: 10.1.200.100/24, Target: 10.2.200.100/24, VIP: *10.1.200.100/24, *10.2.200.100/24**). This topology is ideal for cloud based network where the server's public IP is the only means to connect to external services.

Note: DxEnterprise will bind the virtual IP to the adapter with the same network mask. A DNS entry must exist for each Vhost/IP address. The entry must include an A record and a [PTR] record for forward and reverse lookup. Windows authentication may fail if these records do not exist. Be sure to create a DNS entry for each Vhost/IP address that you create. Dynamic DNS registration is not supported.

Priority

This setting defines the importance (from 1 to 5, 5 being most important) of the Vhost relative to other Vhost(s) running on a system. When there is a system resource (processor, memory, disk I/O, network I/O) pressure or a system failure, DxEnterprise uses this value to determine the best possible cluster member to start the Vhost.

Auto Failback

This policy is intended to return the Vhost to its original configuration, or as close to it as possible. After the Vhost fails over to a backup node, DxEnterprise watches the health of the nodes that are higher in the list of nodes configured for that Vhost. When the health of one of these nodes is equal to or greater than the backup node where the Vhost currently resides, the Vhost will automatically attempt to fail over to that node.

Note: By default the Vhost remains active on the backup node as long as it is healthy.

Available Nodes

Move the DxEnterprise servers or nodes on which the Vhost should be configured from the Nodes Available column to the Selected Nodes column. The first node that you select is the primary node. The other nodes that you select are backups. You can use the up and down arrows to reorder the nodes in the Selected Nodes column.

When you click **OK**, a confirmation dialog displays asking the user to confirm the changes.
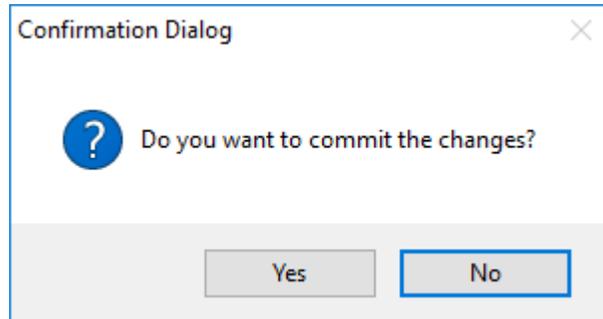
When you click **Yes** on the Confirmation Dialog, DxEnterprise will create the Vhost.

If you click the **Close** button, the virtual host will not be created and the dialog will close.

Manage a Vhost Diskgroup

A diskgroup is a logical set of disks that are added to a Vhost. When a disk is added to a Vhost diskgroup, the disk will be set online on the active node and offline on all other nodes. If there is a failure of a disk within the diskgroup, the Vhost will failover onto the next available node in the cluster.

To add a disk to a Vhost diskgroup, right-click on **Diskgroups** under the Vhost, select **Manage virtual host diskgroup**.
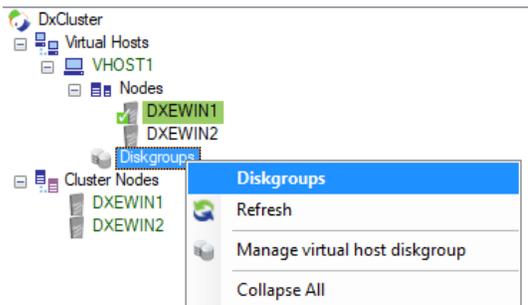
The *Virtual Host Diskgroup Management* window then appears. Select the desired disk(s) in the Available Disks window and click on the right arrows (or double-click the disk) to move the desired disk(s) to the Selected Disks window. To remove the Selected Disks, use the left arrows (or double-click the disk) to move the disks back to the Available Disks window.
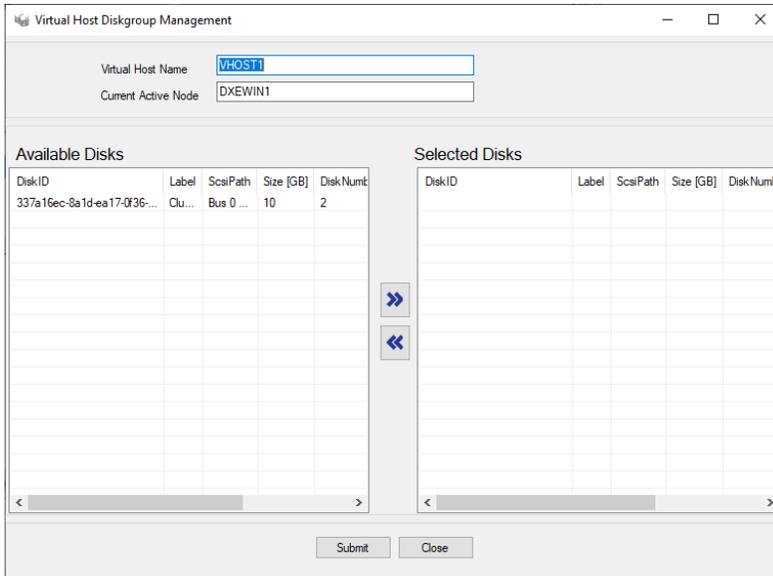
Click to commit the changes.

Click to cancel the process without making any changes.

Add a SQL instance to a Vhost

When a SQL Server instance is added to a Vhost, DxEnterprise virtualizes the network name and IP address associated with the SQL Server instance creating a Virtual SQL Server instance. Clients can then access the Virtual SQL Server instance via the Vhost\instance name.

Assigning a SQL Server instance to a Vhost creates a managed instance. To add a SQL Server instance to a Vhost, select the Vhost on the DxAdmin explorer tree, right-click, and select **Add SQL instance**.
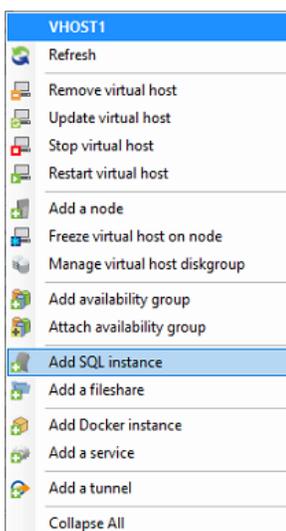
The *Virtual Host Instance Maintenance* window then appears.

Instance Name

This field lists all of the SQL Server instances that are available for assignment to this Vhost. Select the appropriate SQL Server instance.

Description

Enter your description for the instance. It is ideal to annotate your SQL Server instances.

TCP Port

Enter the port number for TCP/IP Sockets that the SQL Server instance should listen on. A static listening port per instance is required.

Data Path

Specify the full path that will be used for the Master data files for this Virtual SQL Server instance. Ensure the path is on shared storage. For Linux, specify the mount path for the managed shared disk.

Log Path

Specify the full path that will be used for the Master log file and Error log files for this Virtual SQL Server instance. Ensure the path is on shared storage. For Linux, specify the mount path for the managed shared disk.

New virtualization

Specify whether DxEnterprise should copy the baseline data from the active node to the SAN. If this checkbox is not checked, DxEnterprise will re-use data defined from Data Path and Log Path as-is.

SQL Authentication

This section is required only if using SQL Server login credentials.

Login

The user name used to login to SQL Server.

Password

The password used to login to SQL Server.

Click **OK** to virtualize the SQL Server instance. The process of virtualizing an instance may take several minutes to complete depending on the system capability and the size of the databases copied to the shared storage.

> *Note: By default DxEnterprise executes under the LocalSystem account context on Windows. It may be necessary to add this account to SQL Admin group in order to have a successful virtualization. If it is necessary to run DxEnterprise under a different account, please ensure the account used for DxCMonitor, DxLMonitor, DxHealthMonitor, DxRegMonitor, and DxStorMonitor is part of the local Administrators group and SQL Admin group, and has full access to any SQL data folders.*

References

- DH2i Support Portal
- DxEnterprise 19.5 Documentation
- DxEnterprise v19.5 DxCli Guide
- Share an Azure managed disk
- Enable shared disk