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Overview

The topic of cloud can be a complex discussion. There are widespread misconceptions and assumptions about what the cloud is, what it can and can’t do, and how best to adopt it. The purpose of this paper is to provide an overview of key cloud concepts, a brief introduction to Microsoft® Azure® (Azure), and specific deployment guidance for using Nimble Storage arrays in a hybrid cloud architecture that is connected to Azure.

Although this document discusses specific types of cloud, it also considers a generic, high-level description of the cloud concept. For many years now, shared infrastructure has been popular and is a well-known architecture for IT. The arrival of mainstream virtualization enabled IT departments to realize the ability to share integrated resources that were traditionally overprovisioned and underutilized. However, the issue with share infrastructure was that resources were still manually provisioned. Cloud, at its most fundamental level, is the application of a highly automated provisioning and management paradigm to a shared infrastructure.

Cloud Characteristics

What makes a cloud, a cloud? In several ways the popular joke that “cloud is just someone else’s computer” is very much accurate. Realistically, however, it goes a bit beyond that.

The National Institute of Standards and Technology (NIST) has done a great job of defining several aspects of cloud (characteristics, deployment models, and service models). NIST special publication 800-145 describes the following features as essential cloud characteristics:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

On-Demand Self-Service

On-demand self-service is the ability to automatically provision resources in the cloud without the need for human interaction. This characteristic is perhaps what most differentiates the cloud from a traditional shared infrastructure architecture.

Broad Network Access

Broad network access describes the ability to access cloud resources from anywhere over standard network connections, whether private or public in nature. Most companies access public cloud resources over a secure connection. For example, Azure Virtual Network (VNet) is used to provide private cloud resources in a public cloud architecture.

Resource Pooling

Resource pooling is the traditional concept of shared infrastructure and secure multi-tenancy. It enables cloud service providers to deploy large amounts of physical resources that can be partitioned logically and securely across multiple customers. The ability to realize every bit of usage from physical resources is one of the key benefits of providing low-cost cloud services.
Rapid Elasticity

Rapid elasticity describes the ability to provision and release resources immediately, without limitations that are based on the number of physical resources available. Alternately, rapid elasticity could be described as rapid scaling of the logical and physical infrastructure. Physically, this means deploying enough hardware to meet or, more realistically, to exceed expected customer demand. This aspect of cloud is a key differentiator between large cloud service providers such as Amazon Web Services® and Azure, who can afford to deploy vast amounts of physical resources, and smaller cloud service providers, who must plan physical expansion more conservatively.

Measured Service

Measured service is the ability to easily manage and monitor cloud resources. The values of manageability and simplicity have had a large resurgence in popularity in recent years. Clearly, they have always been important, but they are even more so today. This is not only because of millennials, who expect everything to be delivered immediately, but also because of the pace of growth in demand for data, compute resources, bandwidth, and more. In addition, customers must be able to plan and predict the costs that are associated with operating workloads in the cloud. An often overlooked aspect of a measured service is that “you get what you pay for.” If you pay for X IOPS, you get X IOPS, no more and no less.
Cloud Types and Service Models

There are four different types of clouds today:
- Public
- Private
- Hybrid
- Community

There are also three common service models:
- Software as a service (SaaS)
- Platform as a service (PaaS)
- Infrastructure as a service (IaaS)

The National Institute of Standards and Technology (NIST) provides concise definitions for each cloud type, known as deployment models, and cloud service models.

Deployment Models

NIST special publication 800-145 contains the following definitions for cloud deployment models:
- **Public cloud**: “The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.”
- **Private cloud**: “The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.”
- **Hybrid cloud**: “The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).”
- **Community cloud**: “The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.”

Service Models

NIST special publication 800-145 contains the following definitions for cloud service models:
- **Software as a service**: “The capability provided to the consumer is to use the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user specific application configuration settings.”
• **Platform as a service:** “The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.”

• **Infrastructure as a service:** “The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).”

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**Storage as a Service (STaaS)**

The commonly used terminology is not limited to what is defined by NIST. Storage as a service (STaaS) is another service model that is of particular interest to Nimble Storage, a Hewlett Packard Enterprise company, and to other storage vendors. Nimble Storage currently offers Nimble Cloud Volumes (NCV), which is an on-demand service for customers’ storage needs.

The STaaS cloud service model can easily extend existing storage arrays into a cloud service. If companies deploy storage arrays into a collocated data center to gain broad network access, they can extend existing storage arrays to STaaS by addressing three key STaaS characteristics:

• On-demand self-service (building a portal to provision storage)
• Rapid elasticity (deploying enough storage to meet demand)
• Measurable service (allowing the storage to be easily managed and monitored)

---

**Nimble Cloud Volumes**

The Nimble Cloud Volumes (NCV) feature provides an enterprise-grade multicloud storage service for running applications in Amazon Web Services and Azure. It is as easy to use as native cloud storage, and it also provides the enterprise-grade reliability and features that your applications need. It is designed for easy data mobility, so it gives you the freedom to move data to, from, or between public clouds and your data center without being locked in. With Infosight Predictive Analytics, you gain global visibility and insights across the stack, no matter where your data lives.
Azure

Azure is one of the largest public cloud providers. It boasts over 600 Azure services to help you deploy, develop, and manage your cloud offerings. Some of the main services that Azure provides include compute, mobile, storage and data management services. Each service normally contains several subcomponents. For example, Virtual Machine is displayed in the main Compute section of Azure, along with Container Services, Disks, Snapshots, and Images—just to name a few additional services. It is easy to become overwhelmed quickly when trying to take it all in at once.

Fortunately, for the purposes of this document and for connecting a Nimble Storage array to Azure, it is necessary to understand only a small subset of Azure services. The Azure website provides additional information about the wide range of cloud services that are available from Azure.

In addition to the key cloud services described in this section, another key aspect of deploying cloud services is determining cost. Azure (like most cloud service providers) provides a simple monthly calculator that can be used to estimate monthly Azure costs.

Compute Services

Virtual Machine Instances

The core product of the Azure compute service is the virtual machine (VM) instance. You can run many kinds of compute instances:

- General purpose instances (A and D series)
- Compute optimized instances (F series)
- Memory optimized instances (D, E and G series)
- Storage optimized instances (L series)

Most instance categories contain a number of instance types, which provide a range of offerings related to number of CPUs, amount of memory, type and amount of storage, and networking performance. For more information about instance types, see Windows Virtual Machines Pricing.

Networking Services

Two key networking services help you connect on-premises storage arrays with cloud-based compute resources:

- ExpressRoute
- Virtual Network (VNet)

ExpressRoute

ExpressRoute enables you to establish a dedicated network connection between your on-premises data center and Azure. A dedicated network connection provides more consistent network connectivity to Azure, increased network security, and increased bandwidth.

Before requesting an ExpressRoute connection from Azure, it is important to find out which localized express route location is nearest to your data center. ExpressRoute connections can be public, private, or
both. IPsec is used to provide secure tunnels between your on-premises network and the ExpressRoute location. Multiple virtual interfaces can be created to partition the connectivity.

VM instances that are running within a VNet can be accessed over an ExpressRoute. For more information about Azure, see the Virtual Network section in this document.

The cost for Azure ExpressRoute breaks down into four core items:

- ISP connectivity costs
- Billable port hours
- Data transfer
- Azure-specific resource costs

ISP costs are related to bandwidth and setup charges. Billable port hours are measured by Azure, and the number of hours billed depends on how many Azure network ports are used. Data transfer is also billed. Data is transferred into the cloud at no cost, but when it is transferred out of the cloud, it is billed. (Data into the cloud is free; data out is charged.) Azure-specific resources are related to the particular services that are accessed, such as virtual instances or storage services.

For more information about Azure ExpressRoute costs, see ExpressRoute pricing.

Virtual Network

A VNet enables you to create a private network within Azure. Users have control over the IP address range used, the gateways, the subnets, and the routing tables. If you combine a VPN connection with ExpressRoute, you can deploy it to connect the VNet to an on-premises data center network. You can further secure VPN connections by encrypting them.

A VNet can be peered to another VNet in Azure to bridge the networks together. Elastic IP addresses (public IPs) can be attached to a network interface to make an instance publicly accessible over the internet.

Although it is possible to attach public IPs to a specific instance, doing so creates a security risk for VNet, which is meant to provide a private network in Azure. Exercise caution when assigning public IP addresses to your Azure resources.
Azure ExpressRoute Storage Deployment

Leveraging on-premises storage arrays into the cloud provides many benefits:

- You can keep storage on-premises (not in the cloud) to provide the best performance and latency for critical workloads, while still allowing access to on-premises data by cloud compute resources.
- Cloud compute resources have access to data without the need to first migrate the data into the cloud.
- InfoSight offers visibility into data and predictive analytics.
- Remote offices or users can access cloud compute resources that access on-premises data directly.
- You can quickly and nondisruptively move volumes between different tiers of storage (such as hybrid to all flash or vice versa).
- You gain enterprise-class storage features such as deduplication and compression for your data sets while still leveraging the benefits of cloud compute infrastructure.

Architecture Overview

The following diagram provides an overview of the ExpressRoute storage architecture.
The on-premises data center in this architecture must traverse multiple internal networks, which demonstrates a more complex network. What is essential to the architecture is that the storage array discovery IP address and data interfaces are routable to the Azure ExpressRoute.

A 10 Gbps connection was provisioned for this reference architecture. Although you can provision connections at less than 10Gbps (through Azure partners), the two speeds that are available when you initiate an ExpressRoute connection from the Azure console are up to 10 Gbps. You can provision one or more connections at whatever bandwidth rates are necessary to support the data access requirements.

Reference this architecture when you plan and design connectivity between on-premises Nimble Storage arrays and Azure compute resources through Azure ExpressRoute. Although each customer’s requirements and network connectivity are expected to vary slightly, the basic architectural foundation shown in this document remains common across installations. Nevertheless, Azure ExpressRoute supports different connectivity designs.

Note The latest introduction of Nimble Cloud Volumes (NCV) helps to simplify the process of creating a connection between an Azure VM and a Nimble Storage array. It is a great way to automate and simplify your cloud experience.

Deploying an Azure Virtual Network

Deploying an Azure instance into a VNet offers several benefits, including the following:

- An Azure instance in a VNet can use a persistent private IP address.
- An Azure instance allows the filtering of inbound and outbound traffic (security groups).
- An Azure instance allows the use of network ACLs (filtering traffic for the entire VNet).

There are many different ways to set up a VNet. For more information about the available options, see the Azure VNet User Guide. The following procedure provides a walk-through of an example VNet setup.

Create and Configure a new VNet

To create and configure a new VNet, complete the following steps:

1. Log in to your Azure account.
2. Click Virtual Network.
3. Click Add. The Create Virtual Network window appears.
4. Type a name in the Name field for the new VNet.
5. In the Address Space field, choose a prefix mask of /22 or less.
6. Set the appropriate subnet address range.
7. Choose the appropriate subscription.
8. In the Resource Group field, either select an existing resource group or create a new resource group.
9. In the Location field, select either West US 2 or East US.
10. Click Create. At this point, the VNet is created and has a single subnet.
Deploying Azure ExpressRoute

The process for deploying an Azure ExpressRoute circuit is covered in detail in the Azure ExpressRoute User Guide. ExpressRoute enables you to extend your on-premises networks into the Microsoft cloud over a private connection. ExpressRoute connections provide multiple benefits:

- Faster speeds
- Lower latencies
- Higher security
- More reliability

Create an Azure ExpressRoute Instance

To create an Azure ExpressRoute instance, complete the following steps:

1. Log in to the Azure console.
2. Click the New link and then Networking.
3. Find and click ExpressRoute to open the ExpressRoute creation page.
4. Create a name for the Circuit Name.
5. Choose a provider (such as Equinix).
6. Select a peering location (where the ISP will provision the connection).
7. Choose the required bandwidth that the provisioned network will have.
8. Choose the proper SKU and billing model and click Create.
Note Choosing the best provider (step 4) and associated location is critical to getting the best performance experience. When you click Create, charges start processing immediately.

Set Up a Virtual Network Gateway

To create and attach a virtual gateway to the VNet, complete the following steps:

1. In Azure, click the More Services icon.
2. Locate and select Virtual Network Gateways, and then click Add. The Create Virtual Network Gateway window appears.
3. Type a name in the Name field for the gateway.
4. Select ExpressRoute as the gateway type.
5. In the SKU drop-down list, select a performance setting of either Standard (1K Mbps), High Performance (2K Mbps), or Ultra Performance (9K Mbps).
6. Click Virtual Network, and then select the virtual network that you previously created as a part of the VNet creation.
7. Click Public IP Address and either select an existing address or create a new address.
8. Choose the proper subscription.
9. If required (as determined by your previous selections), choose the location.
10. Click Create.

Note It might take up to 20 minutes for the new virtual network gateway to be created.

Deploying an Azure Instance

Deploying and configuring an Azure instance involves two tasks:

- Launching a new Azure compute instance
- Connecting to the new instance and configuring it

Launch a New Azure Instance

To launch a new Azure instance, complete the following steps:

1. Log in to the Azure console.
2. Click New or the plus sign (+) on the left side of the screen.
3. Click the Compute section.
4. In the Compute section, select the type of compute instance you want to deploy.
5. To create the instance you have selected, provide the following required information:
   - Name
   - VM disk type (SSD or HDD)
   - User name (something other than administrator)
   - Password
   - Subscription (In this example, pay-as-you-go was selected.)
   - Resource group (new or previously existing)
   - Location
6 After all of the information is provided, click OK.
7 Locate the instance type that matches your requirements and click Select. For this example, an instance type with the following characteristics was selected:
   • DS1_V2
   • Cores = 1
   • 3.5 GB
   • 2 Data disks
   • 3200 maximum IOPS
   • 7 GB local SSD
   • Load balancing
8 On the next page, the following information is requested:
   • Storage (Choose No because a Nimble Storage volume will be used.)
   • Network
     • Virtual network (Use the VNet that was created earlier.)
     • Subnet
     • Public IP address
     • Network security group
   • Extensions
   • High availability
   • Monitoring
The last page completes a validation against the configuration you have chosen. When the validation is complete, click **Purchase** at the bottom of the screen.

**Connect to and Configure the Instance**

To connect to and configure the new Azure instance, complete the following steps:

1. Open the Azure Instances dashboard from the Azure web console.
2. Locate the instance in the list and click the **virtual instance**.
3. Locate the public IP address when the details for the instance are displayed.
4. Using Microsoft Remote Desktop Protocol (RDP), connect to the Azure instance. This step requires the user name and password that you provided to the instance earlier during its creation.
   **Note** The next steps are related to connecting to the instance from a Windows® based system through Microsoft Remote Desktop Connection. With the credentials determined at this point, MAC® and LINUX® users should understand how to connect to the instance by using the appropriate local OS tools.
5. Open the **Remote Desktop Connection** application on your local host.
6. Enter the appropriate IP address in the **Computer field**. Click **Connect**.
7. In the Windows Security window, enter **Administrator** for the user name and use the password that was generated.
8. It is likely that the system will prompt you to accept a certificate before connecting to the remote system. If this window appears, select the checkbox **Don’t ask me again for connections to this computer** and click **Yes**. The remote desktop is displayed.
9. Next, multipath I/O (MPIO) must be installed on the system. Click **Windows** and select **Server Manager** from the Start menu.
10. From the menu options located to the top right of the window, select **Manage** then click **Add Roles and Features**.

11. On the Before You Begin page of the Add Roles and Features wizard, click **Next**.
12. On the Installation Type page, **Role-based or feature-based installation** is selected. Click **Next**.
13. On the Server Selection page, verify that **Select a server from the server pool** is selected and that **Windows Server** is highlighted in the Server Pool list. Click **Next**.
14. On the Server Roles page, click **Next**.
15. On the Features page, locate **Multipath I/O** in the Features list and select the checkbox for the feature. Click **Next**.
16. On the Confirmation page, click **Install**. Wait for the installation to be completed.
17. On the Results page, click **Close**.
18. Close the Server Manager window.
19. Open Internet Explorer and navigate to **InfoSight**.

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**Note** Internet security is set to high by default. To navigate to InfoSight, you must either add blocked sites as you navigate or lower the internet security settings.

20 Enter the appropriate user name and password to log in to InfoSight.

**Note** If you do not have existing credentials, click the **New user? Enroll now** link and register for an account before returning to this step.

21 From the main InfoSight dashboard, select the **Resources** menu and select **Software Downloads** from the list.

22 Locate and click the **Windows Toolkit (NWT)** link located to the left of the page under **Integration Kits**.

23 Click the **Show other versions** link located next to the **Current Version** section.

24 Locate the entry for **3.2.0.410 (RC)** from the **Other Versions** list. Click the **Software (64-bit)** link to download the Windows Toolkit. After it is downloaded, launch the installation file.

**Note** Use a version of the Windows Toolkit that is the same as or higher than the version of NimbleOS that is installed on the Nimble Storage array. Although this example uses **3.2.0.410 (RC)**, you can use any supported version that is appropriate for your configuration.

25 On the Welcome page of the installation wizard, click **Next**.

26 Select **I accept the terms in the license agreement** and click **Next**.

27 Verify that all critical Microsoft hotfixes have been applied to the system and click **Next**.

**Note** To generate a report that identifies any hotfix gaps, click **Hotfix Report**. Resolve gaps by installing the appropriate hotfixes. An explanation of how to install hotfixes is outside the scope of this document, but you must resolve all gaps before you can continue the installation.
On the Nimble Logs Directory page, click Next.

On the Custom Setup page, click the Nimble Connection Management for iSCSI feature listed under the features list. Click the option This feature will be installed on local hard drive. Click Next.

On the Ready to Install the Program page, click Install.

During installation, a popup window indicates that Nimble Storage will adjust registry key values. Click OK.

When the installation is complete, click Finish.

A system restart is necessary to finalize the installation process. Click Yes to restart.

When the system restart is complete, click Windows and locate the Nimble Storage applications in the Start menu. Click the Nimble Connection Manager application.

Record the IQN string that is located in the Initiator Name field. You will need it for the Nimble Storage array configuration.

Deploying the Nimble Storage Array

The basic installation and configuration of a Nimble Storage array is outside the scope of this document. For those instructions, see the appropriate installation and administration guide documentation available from InfoSight. When the basic setup and configuration of the array is complete, proceed to complete the array configuration tasks that are specific to deploying a volume for the Azure instance.

NimbleOS 3.4 and later includes the next-generation array management interface (AMI). NimbleOS versions earlier than 3.4 run the “classic” AMI. The steps that are necessary to configure the array differ slightly between the two interfaces. This section is divided into the steps that used in the classic AMI and those that used in the next-generation AMI.

Configure an Initiator Group and Deploy a Volume in the Classic AMI

To configure an initiator group and deploy a volume in the classic AMI, complete the following steps:

1. Open a web browser and navigate to the AMI.
2. Enter the appropriate user name and password and click Log In.
Configure an Initiator Group and Deploy a Volume in the Next-Generation AMI

To configure the initiator group and deploy a volume in the next-generation AMI, complete the following steps:

1. Open a web browser and navigate to the AMI.
2. Enter the appropriate user name and password and click Log In.
3. On the array dashboard page, select the Manage menu and select Data Access from the list.
4. On the Data Access page, click the plus sign (+) to add an initiator group.
5. In the Create an Initiator Group window, enter an appropriate name for the initiator group in the Name field (for example, Azure.TME.VM). Verify that Use all configured subnets is selected in the Subnets drop-down list.

   Note: You can use a single initiator group for all IQNs that are associated with Azure instances.

6. In the Initiators section, click Add.
7. Set the initiator Name field for the IQN entry to something descriptive of the specific Azure instance (for example, VM.TME.M4). Set the IQN field to the IQN string that was recorded from the Azure instance (for example, iqn.1991-05.com.microsoft:win-9jtu9s7f4v2). Set the IP Address field to the private IP address of the Azure VM (for example, 172.41.14.218).
8. Click Create.
9. Select the Manage menu and select Data Storage from the list.
10. On the Data Storage page, click the plus sign (+) to add a new volume.
11. In the Create Volume window, set the following values:
• **Name:** Azure.TME.VM.M4
• **Performance policy:** Windows File Server
• **Size:** 1 TiB
• **Data protection:** Not protected
• **Access:** Azure.TME.VM

*Note* These values are for the example used in this document. Use the values that are appropriate for your configuration.

12 Click **Create**.

### Deploying a Host Data Volume

With the Windows environment prepared and the Nimble Storage array configuration complete, you can complete the host volume configuration, which involves two tasks:

- Connecting the storage volume
- Allocating the volume

### Connect the Storage Volume

To connect the storage volume, complete the following steps:

1. Open the **Remote Desktop Connection** application on your local host.
2. Enter the appropriate IP address in the **Computer** field. Click **Connect**.
3. In the Windows Security window, enter **Administrator** for the user name and use the password that was generated.
4. It is likely that the system will prompt you to accept a certificate before connecting to the remote system. If this window appears, select the checkbox **Don’t ask me again for connections to this computer** and click **Yes**. The remote desktop is displayed.
5. If the Nimble Connection Manager application is not already open, open it by clicking **Windows** and then locate the **Nimble Storage** applications in the Start menu. Click the **Nimble Connection Manager** application.
6. In the main window of the Nimble Connection Manager, under the **Nimble Discovery IP (Port 3260)** section, click **Add**.
7. In the **Add Nimble Discovery Target Portal IP window**, click **Advanced**.
8. In the **Advanced Target Portal Entry window**, enter the iSCSI discovery IP address of the Nimble Storage array (for example, 10.18.128.193). Click **OK**.
9 In the Add Nimble Discovery Target Portal IP window, click OK.
10 In the main window of the Nimble Connection Manager, verify that the discovery IP address has been added to the list in the Nimble Discovery IP (Port 3260) section. Leave the application open.
11 Click Windows and click the search icon (the magnifying glass) from the Start page.
12 Type iSCSI initiator in the search field and select the iSCSI Initiator application entry from the search list.
13 On the Targets tab of the iSCSI Initiator Properties window, enter the iSCSI discovery IP address of the Nimble Storage array in the Target field (for example, 10.18.128.193). Click Quick Connect.
14 In the Quick Connect window, verify that the proper IQN is listed and that the Status column indicates Connected. Click Done.
15 In the iSCSI Initiator Properties window, in the Discovered Targets section, select the IQN that is associated with the Nimble Storage array. While it is highlighted, click Connect.
16 In the Connect to Target window, select the Enable multi-path checkbox and click OK.
17 Close the iSCSI Initiator Properties window.
18 Open the Nimble Connection Manager application (which should have been left open from step 10).
19 Click the Nimble Volumes tab.
20 Verify that the volume is listed as connected and healthy in the Discovered Nimble Volumes section.

Allocate the Windows Volume

To finish allocating and formatting the Microsoft Windows volume, complete the following steps:

1 On the Start page, click Windows and click the search icon (the magnifying glass).
2 Type disk management in the search field and select Create and format hard disk partitions from the search list.
3 In the main window of the Disk Management application, an unknown disk entry should be displayed that matches the size of the volume created on the Nimble Storage array (for example, Disk 1, Unknown, 1024.00 GB, Offline, Unallocated).
4 Right-click the **unknown disk icon** and select **Online** from the menu.
5 Right-click the **unknown disk icon** and select **Initialize Disk** from the menu.
6 In the **Initialize Disk** window, click **OK**. In response, the disk entry should show as online and basic, but still unallocated.
7 Right-click the **Unallocated** section of the disk entry and select **New Simple Volume** from the menu.
8 On the **Welcome** page of the **New Simple Volume** wizard, click **Next**.
9 On the **Specify Volume Size** page, verify that the maximum size is selected, then click **Next**.
10 On the **Assign Drive Letter or Path** page, verify that **Assign the following drive letter** is selected and that the drop-down list includes an appropriate drive letter (for example, D). Click **Next**.
11 On the **Format Partition** page, enter an appropriate name in the **Volume Label** field (for example, TME.Instance.M4). Click **Next**.
12 On the **Complete** page, click **Finish**.
13 The disk entry should show the status of the disk as **Formatting**. When the formatting is complete, the disk status changes to **Healthy (Primary Partition)**.
14 Open **Windows File Explorer** and verify that the new volume is shown and is accessible.

**Note** To further verify that the volume is working correctly, try copying or creating files in the new volume.
Conclusion

There is no doubt that you can gain significant benefits from deploying on-premises or collocated storage arrays in support of cloud compute resources. You can take advantage of the enterprise features, availability, accessibility, and scalability of best-in-class storage solutions. Most important, you retain control over one of the most—if not the most—critical asset a company has, its data.

Cloud isn’t the answer to everything (at least not yet), but it is clear that the new reality of IT revolves around leveraging both on-premises and cloud architectures in a hybrid model. Hybrid cloud architectures that span public cloud, private cloud (on-premises or hosted), and on-premises resources deliver the most realistic and robust technology capabilities for businesses today.

This document will be updated continually to reflect the latest deployment guidance and recommendations. For more information about Azure features, consult the multitude of online documents available on the Azure website. For additional information about Nimble Storage technology, see the documentation section of InfoSight.
About the Author

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Freddy Grahn has over 20 years of experience working with enterprise databases and over 10 years of experience in the storage industry. He has written many Oracle performance papers and supported hundreds of customers in deploying Oracle solutions. Freddy is known around the office as “The Oracle,” but he has yet to predict the future.
## Version History

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<thead>
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<th>Version</th>
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<th>Description</th>
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<tbody>
<tr>
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<td>Initial release</td>
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