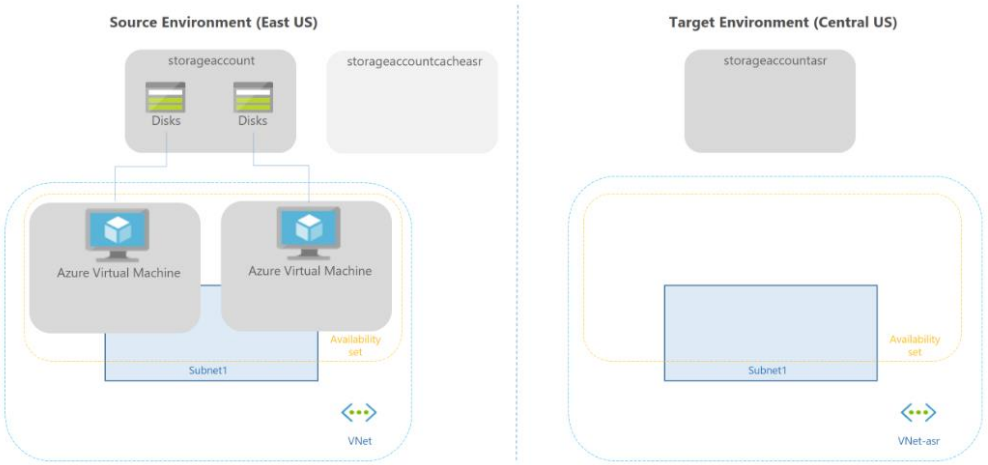
Microsoft Azure Site Recovery (DR) and backup
Cost Managment

Site Recovery

- Site recovery ensures business continuity by keeping virtual machines and apps running during outages.
- When an outage occurs you fail over to the secondary site and access apps from there after the primary location is running again you can fail back on it.
- Backup services - helps keeps the data safe and secure and recoverable by uploading it in Azure.

Replication Process

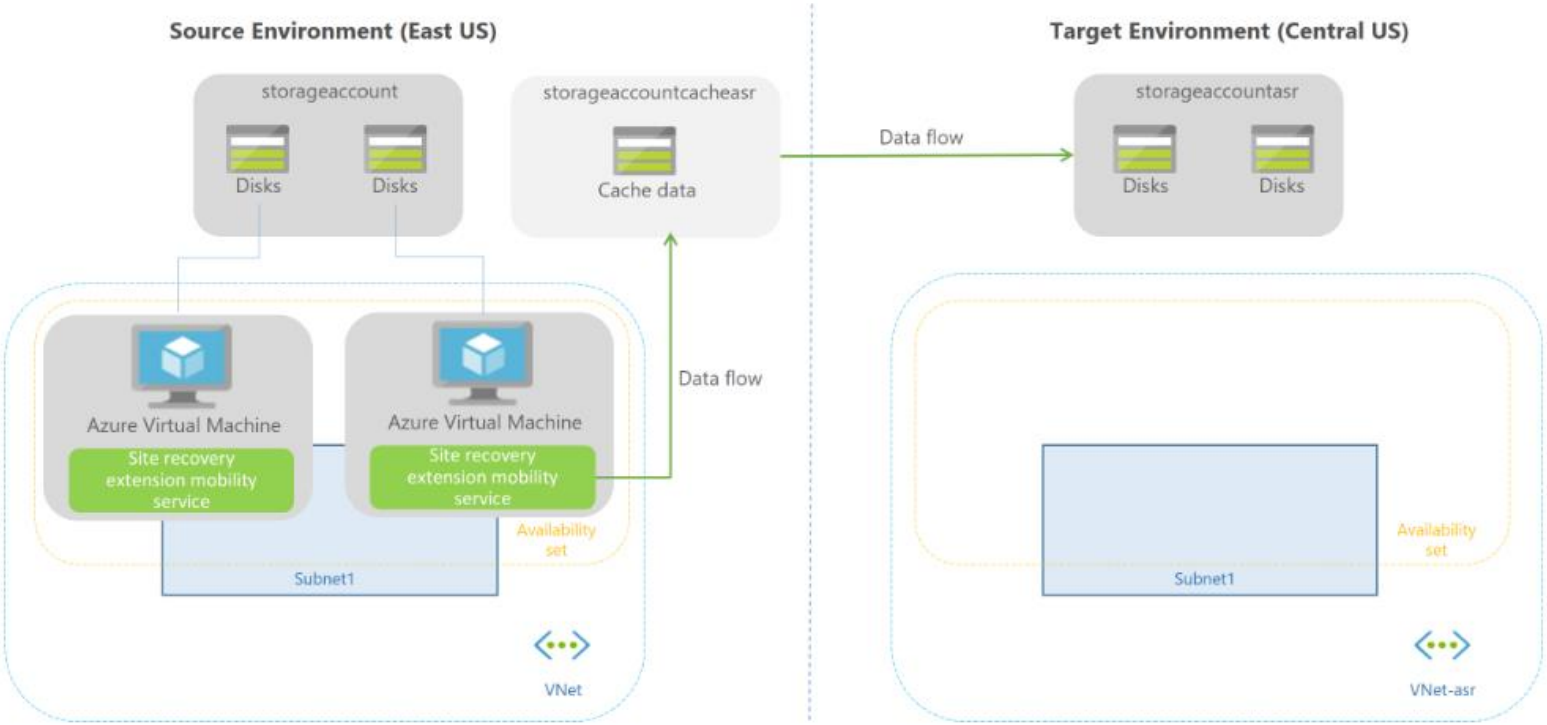
Step 1 - Enable the Replication from the VM menu in site recovery, following resources are automatically created



•Target Resource Group - The resource group to which replicated VM belong after failover
•Target Virtual Network - The Vnet in which replicated VM are located after failover.
•Cache storage account - Before source VM changes are replicated to target storage account,they are tracked and sent to cache storage account.
•Target Availability sets - Availability sets in which replicated VM are located after failover.

Step -2

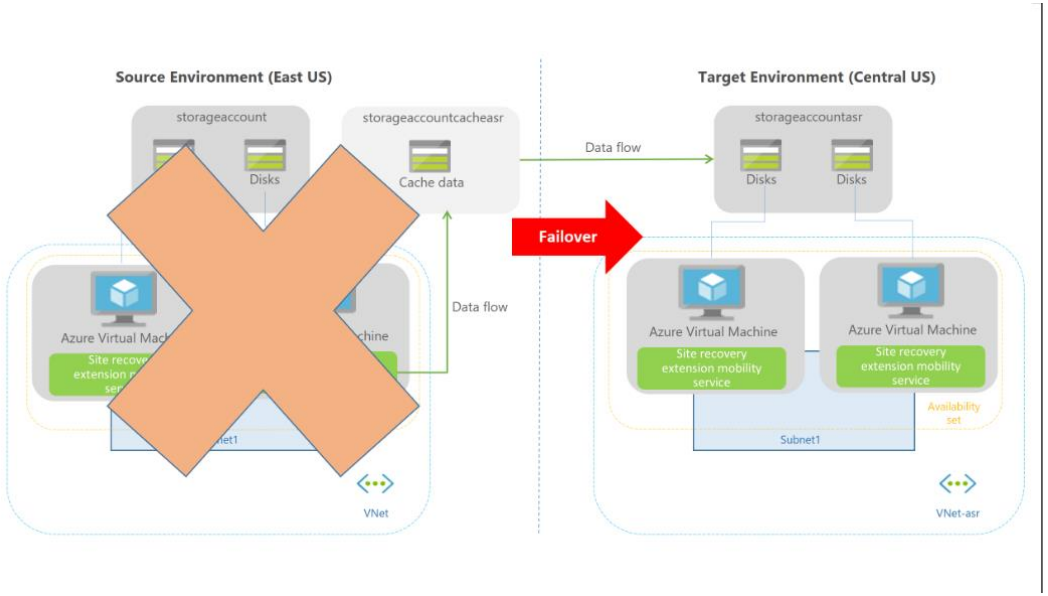
•As replication is enabled the site recovery VM mobility agent is automatically installed on the VM.
•Continuous replication is configured on the VM ,data writes on the VM disk is continuously transferred to the cache disk.



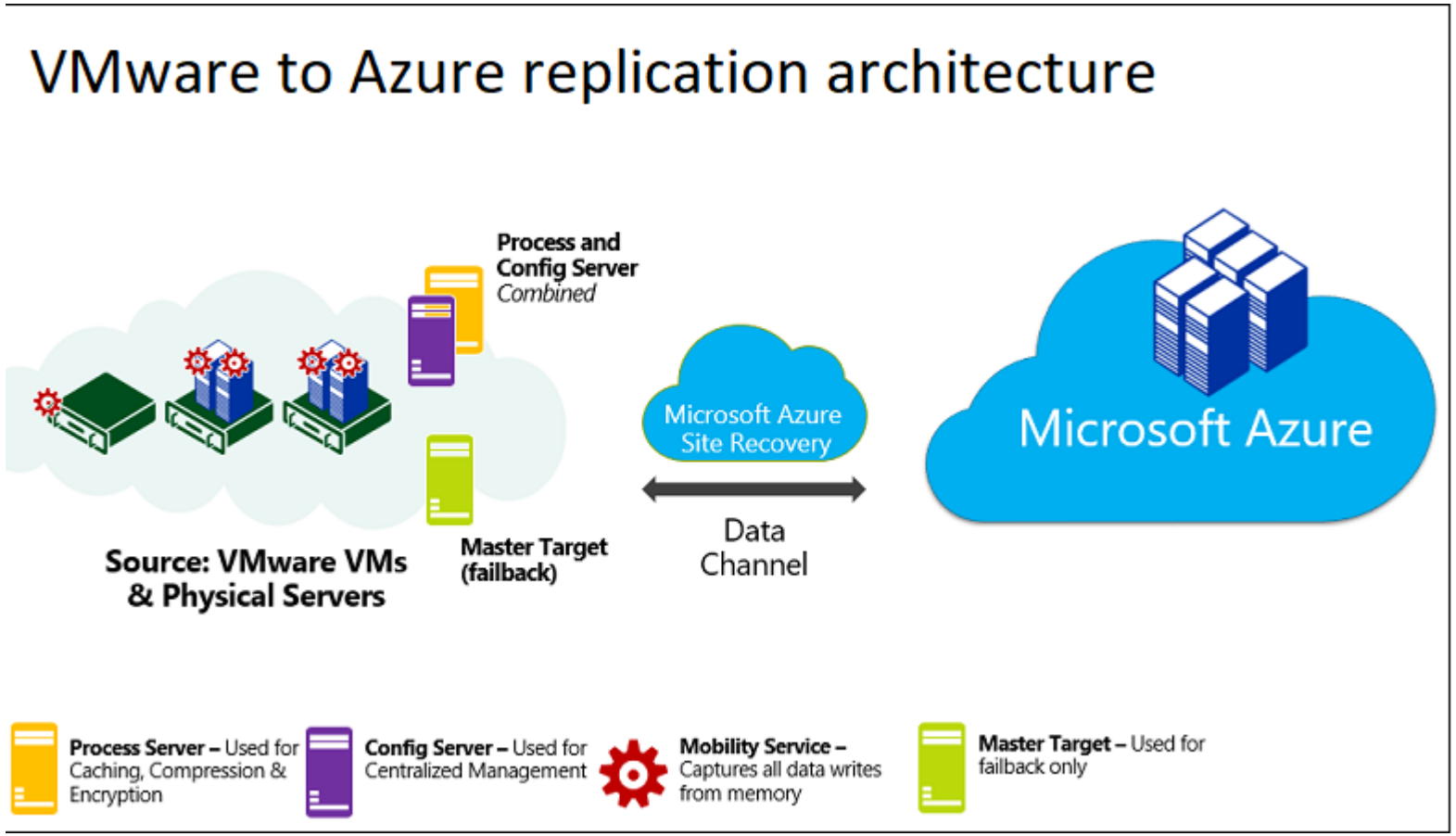
•Site recovery needs inbound connectivity to the VM ,only outbound connectivity is required for following scenarios
  - Site recovery service
  - Office 365 authentication URL
  - Cache storage account IP address

Step 3

•After continuous replication is in progress disk writes are immediately transferred to the cache storage.
•Site recovery processes the data and sends it to Target storage account or replica managed disk.



•When you initiate a failover a VM created in target resource group ,target virtual network ,target subnet and in target availability set.
•During failover you can use and recovery point.
•Site recovery can be used to set up a failover site as well as migrate on premises VM to new site.
•Data replicates to Azure storage when the failover is run Azure automatically creates a VM from the storage account.
•Recovery can only happen via Public Peer EXPRESSROUTE and site to site is not supported.



Step 1 - Setup the replication components ,azure account, virtual network and recovery services vault.

Azure Migrate

- Azure migrate service assesses on premises workloads for migration into Azure.
- After Assessment we can use ASR or Database migration tool to kick off migration.

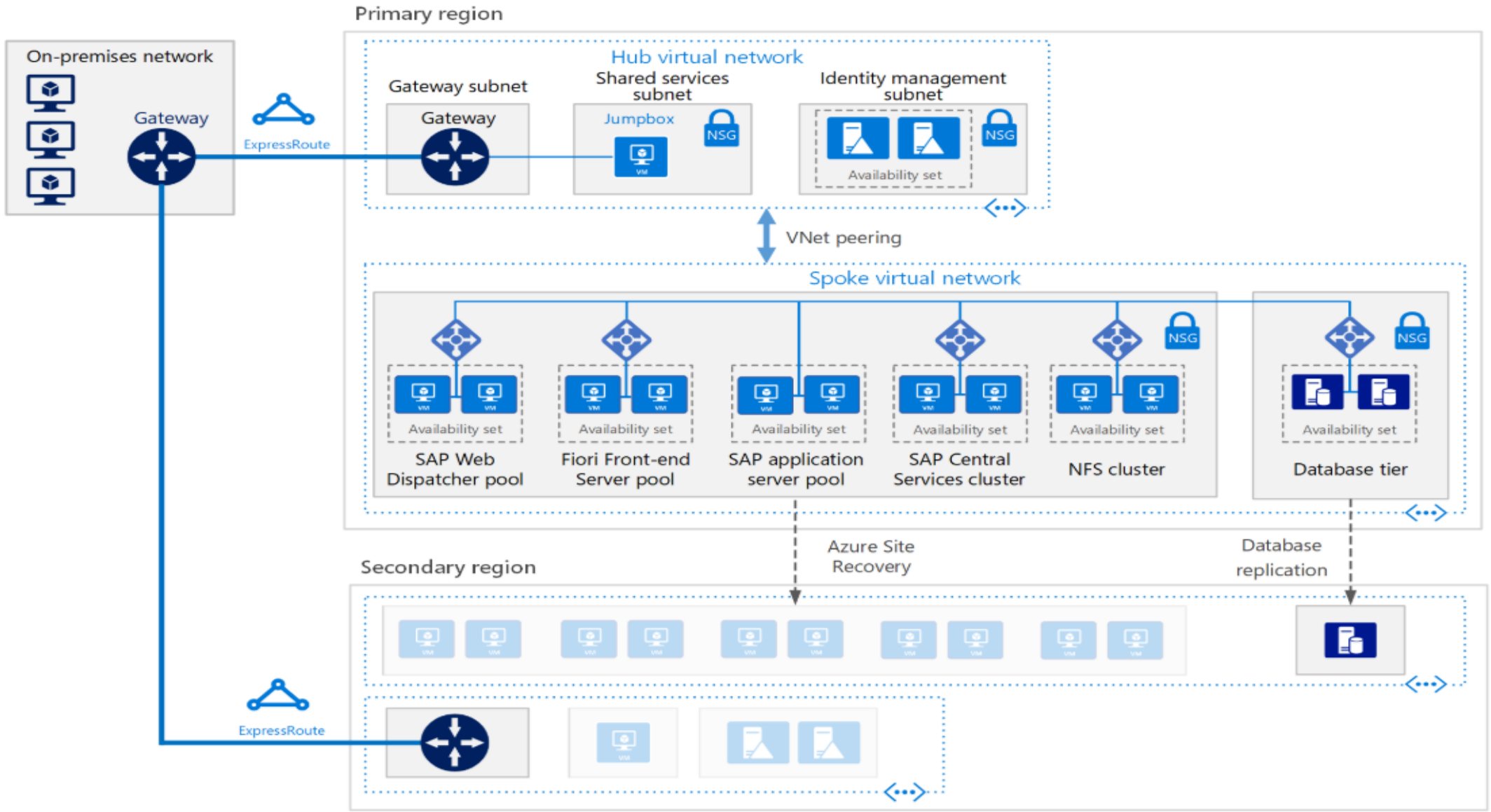
How Does Azure migrate work

- Step 1 - Create an Azure Migrate Project
- Step 2- Azure migrate uses an on prem server called the collector appliance to discover information about on prem machines. This VM has to be imported into the Vcenter server.
- Step 3 - Connect to the collector server and start discovery of on prem devices.
- Step 4 - The collector collects information using Vmware CLI and is agentless.
- Step 5 - The metadata is pushed to Azure migrate project and can be viewed in the Azure portal.
- Step 6 - Using this assessment you can gather discovered VM into groups with same application ,use dependency visualization to view dependencies.
- Step 7 - Once the group is formed you can create assessment for the group.
- Step 8 - Once assessment is done it can be downloaded in an Excel format.

Port Requirements

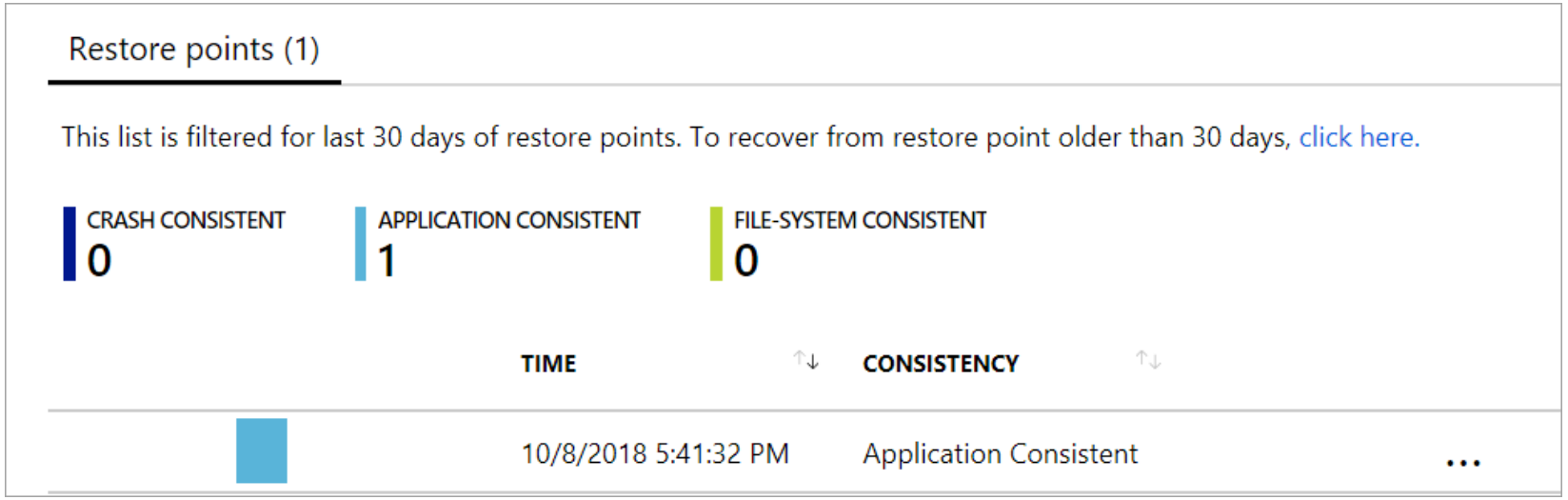
Component	To Communicate with	Port Required	Reason
Collector	Azure migrate Service	TCP443	Collector connects to service over port 443
Collector	vCenter Server	Default 443	By default collector connects to port 443 if server listens to different port it should be configured as an outgoing port on collector VM
On prem VM	Log analytics and workspace	TCP443	

Typical DR setup



Azure Backup

- You can protect your data by taking backups at regular intervals.
- Azure Backup creates recovery points that are stored in geo-redundant recovery vaults.
- When the Azure Backup service initiates a backup job, it triggers the backup extension to take a point-in-time snapshot.
- The Azure Backup service uses the VMSnapshot extension.
- Backup Policy.
- Recovering from Backup



When planning a solution in the cloud, there's always the challenge of balancing cost against performance. It can feel like a guessing game whether your selected options will stay within budget or if you'll have a surprise on your next bill.

You need to be able to confidently answer several questions:
•What will this solution cost this fiscal year?
•Is there an alternate configuration you could use to save money?
•Can you estimate how a change would impact your cost and performance *without* putting it into a production system?

Usage meters

When you provision an Azure resource, Azure creates one or more meter instances for that resource. The meters track the resources' usage, and generate a usage record that is used to calculate your bill.

•Compute Hours
•IP Address Hours
•Data Transfer In
•Data Transfer Out
•Standard Managed Disk
•Standard Managed Disk Operations
•Standard IO-Disk
•Standard IO-Block Blob Read
•Standard IO-Block Blob Write
•Standard IO-Block Blob Delete

Resources are always charged *based on usage*. For example, if you de-allocate a VM then you will not be billed for compute hours, I/O reads or writes or the private IP address since the VM is not running and has no allocated compute resources. However you will incur storage costs for the disks.

Factors affecting costs

Just like your on-premises equipment costs, there are several elements that will affect your monthly costs when using Azure services. Let's look at a few of the primary factors including resource type, services, the user's location, and the billing zone.

Resource type

Costs are resource-specific, so the usage that a meter tracks and the number of meters associated with a resource depend on the resource type.

Services

Azure usage rates and billing periods can differ between Enterprise, Web Direct, and Cloud Solution Provider (CSP) customers. Some subscription types also include usage allowances, which affect costs.

Location

Azure has datacenters all over the world. Usage costs vary between locations that offer particular Azure products, services, and resources based on popularity, demand, and local infrastructure costs.

Azure billing zones

Bandwidth refers to data moving in and out of Azure datacenters. Most of the time inbound data transfers (data going *into* Azure datacenters) are free. For outbound data transfers (data going *out* of Azure datacenters), the data transfer pricing is based on **Billing Zones**.

Azure pricing calculator

To make estimates easy for customers to create, Microsoft developed the **Azure pricing calculator**. The Azure pricing calculator is a free web-based tool that allows you to input Azure services and modify properties and options of the services. It outputs the costs per service and total cost for the full estimate.

Predict and optimize with Cost Management and Azure Advisor

Azure Advisor is a free service built into Azure that provides recommendations on high availability, security, performance, operational excellence, and cost. Advisor analyzes your deployed services and looks for ways to improve your environment across each of these areas.

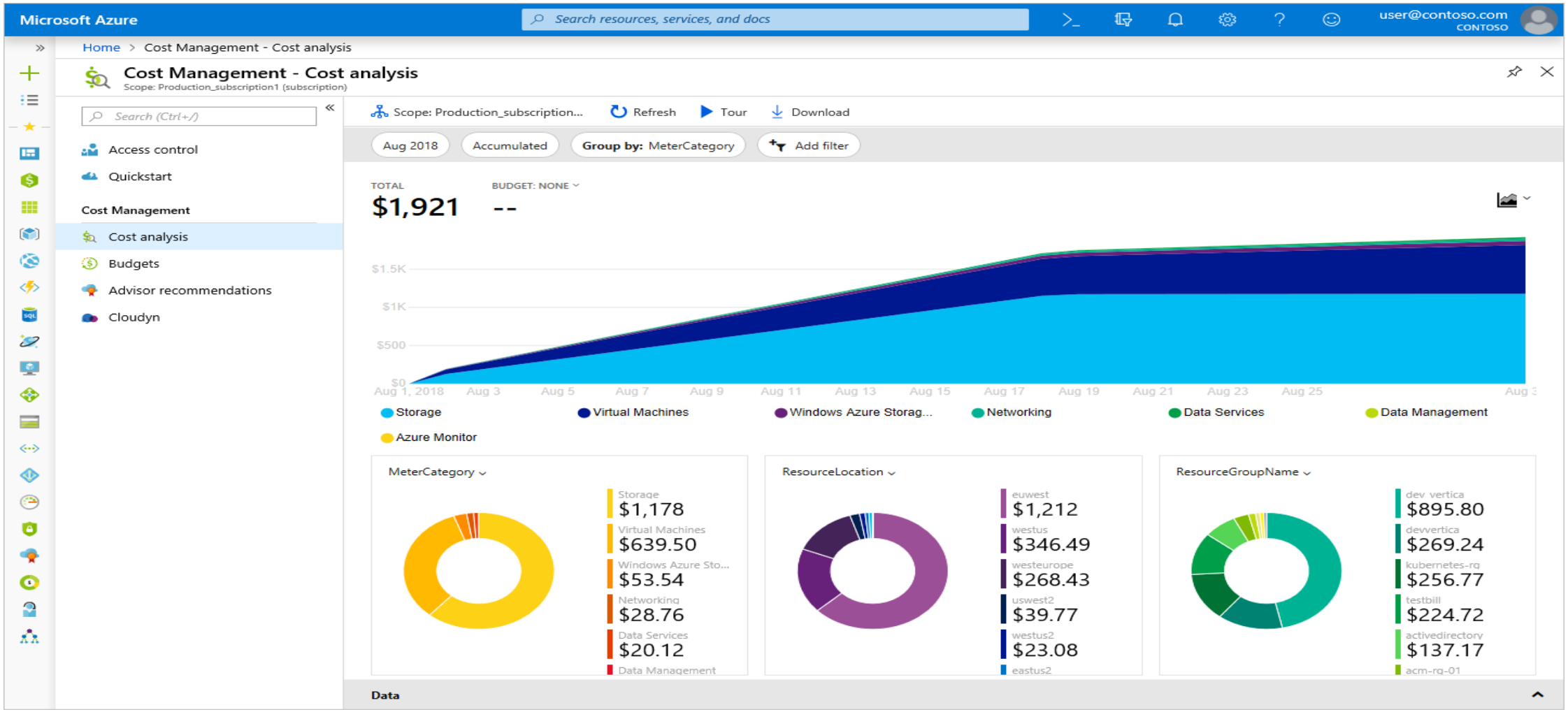
Reduce costs by eliminating unprovisioned Azure ExpressRoute circuits. This recommendation identifies ExpressRoute circuits that have been in the provider status of *Not Provisioned* for more than one month.

Buy reserved instances to save money over pay-as-you-go. Advisor will review your virtual machine usage over the last 30 days and determine if you could save money in the future by purchasing reserved instances.

Right-size or shutdown underutilized virtual machines. This analysis monitors your virtual machine usage for 14 days and then identifies underutilized virtual machines. Virtual machines whose average CPU utilization is 5 percent or less and network usage is 7 MB or less for four or more days are considered underutilized virtual machines.

Azure Cost Management

Azure Cost Management is another free, built-in Azure tool that can be used to gain greater insights into where your cloud money is going. You can see historical breakdowns of what services you are spending your money on and how it is tracking against budgets that you have set. You can set budgets, schedule reports, and analyze your cost areas.



Save on infrastructure costs

Use Azure credits

Visual Studio subscribers can activate a monthly credit benefit that allows you to experiment with, develop, and test new solutions on Azure. Use Azure credits to try out new services such as App Service, Windows 10 VMs, Azure SQL Server databases, Containers, Cognitive Services, Functions, Data Lake, and more, without incurring any monetary costs.

Use spending limits

By default, Azure subscriptions that have associated monthly credits (which includes trial accounts) have a *spending limit* to ensure you aren't charged once you have used up your credits. This feature is useful for development teams exploring new solution architectures as it ensures you won't have an unexpectedly large bill at the end of the month.

Use reserved instances

If you have virtual machine workloads that are static and predictable, using reserved instances is a fantastic way to potentially save up to 70 to 80 percent off the pay-as-you-go cost. The savings can be significant, depending on the VM size and duration the machine runs. The following illustration shows that using Azure reserved instances saves you up to 72 percent and using reserved instance plus Azure Hybrid Benefit saves up to 80 percent in costs.

Right-size underutilized virtual machines

Recall from our previous discussion that Azure Cost Management and Azure Advisor might recommend right-sizing or shutting down VMs. Right-sizing a virtual machine is the process of resizing it to a proper size. Let's imagine you have a server running as a domain controller that is sized as a **Standard_D4sv3**, but your VM is sitting at 90 percent idle the vast majority of the time. By resizing this VM to a **Standard_D2sv3**, you reduce your compute cost by 50 percent.

Deallocate virtual machines in off hours

If you have virtual machine workloads that are only used during certain periods, but you're running them every hour of every day, you're wasting money. These VMs are great candidates to shut down when not in use and start back up on a schedule, saving you compute costs while the VM is deallocated.

Delete unused virtual machines

This advice may sound obvious, but if you aren't using a service, you should shut it down. It's not uncommon to find non-production or proof-of-concept systems that are no longer needed following the completion of a project. Regularly review your environment and work to identify these systems. Shutting down these systems can have a multifaceted benefit by saving you not only on infrastructure costs but also potential savings on licensing and operations.

Save on licensing costs

Linux vs. Windows

Many of the Azure services you deploy have the choice of running on Windows or Linux. In some cases, the cost of the product can be different based on the OS you choose. Where you have a choice, and your application doesn't depend on the underlying OS, it's useful to compare pricing to determine whether you can save money.

Azure Hybrid Benefit for Windows Server

Many customers have invested in Windows Server licenses and would like to repurpose this investment on Azure. The Azure Hybrid Benefit gives customers the right to use these licenses for virtual machines on Azure.

Offline Lab Work

- Define Backup Policy.
- Recovering from Backup.
- Site Recovery perform a test failover