

Quoting Azure IaaS From Zero to Hero

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Agenda

- Cloud Principles
- Azure IaaS Quoting
- Contractual models and discounts
- Azure quoting tools – Demo
- Q&A

Why?

Objectives

- At the end of this session you will have the knowledge to:
 - Understand pricing of the components for each IaaS service
 - Learn the tools (official and unofficial) available to build Azure quotes
 - Know where to look for information
- Things that we will not cover:

we won't get into details of product features (i.e. we mention what is a Standard IP address, but we won't explain what makes it different than Basic)

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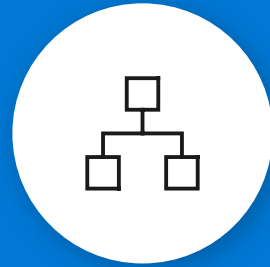
Secure, cost-effective, and powerful



Compute



Storage



Networking



**Security and
management**

Cloud principles



Pay per Use



Right sizing



Snoozing



Location

Pay per use



- You only pay when the service is consumed
- Monthly Billing period
- Each Azure component has its own metric:
 - VM – per running minute
 - Storage – average storage size per month
 - Service Bus – millions messages per month
 - Etc.

Location

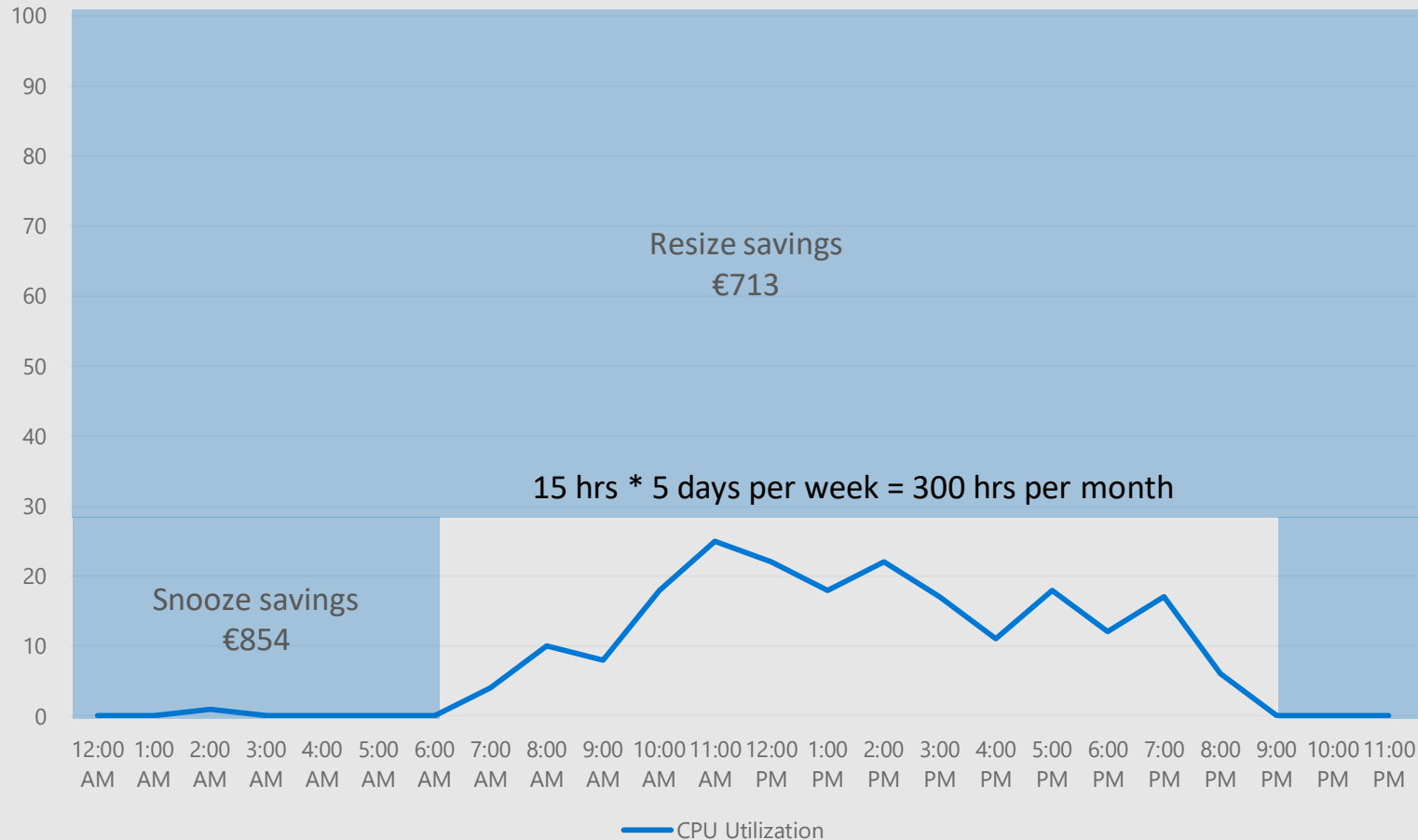


- Service Pricing differs per region. A VM in East US is cheaper than in West Europe
- Not all services are available in each region

Right sizing & snoozing



P95 CPU utilization



D14v2 SKU, ~€950/month

+

Rightsizing

=

D12v2 SKU, ~€237/month

+

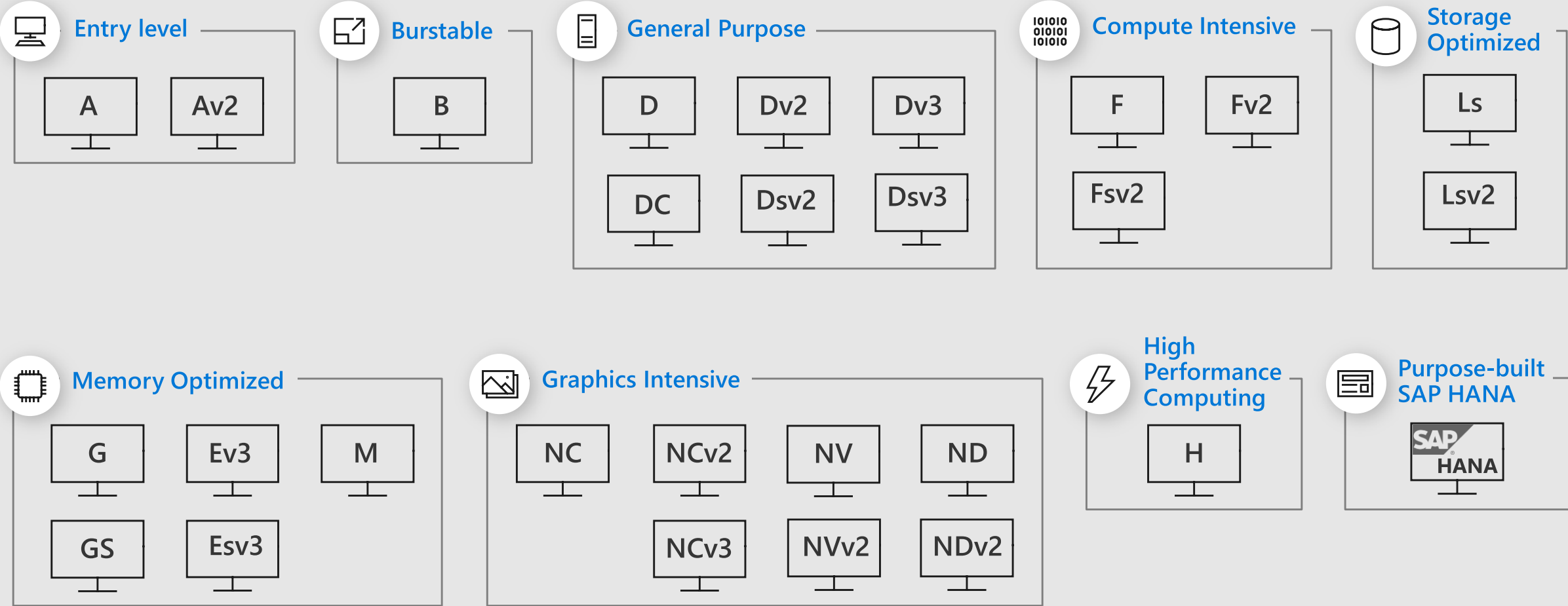
Snoozing

=

D12v2 SKU, ~€95,88/month

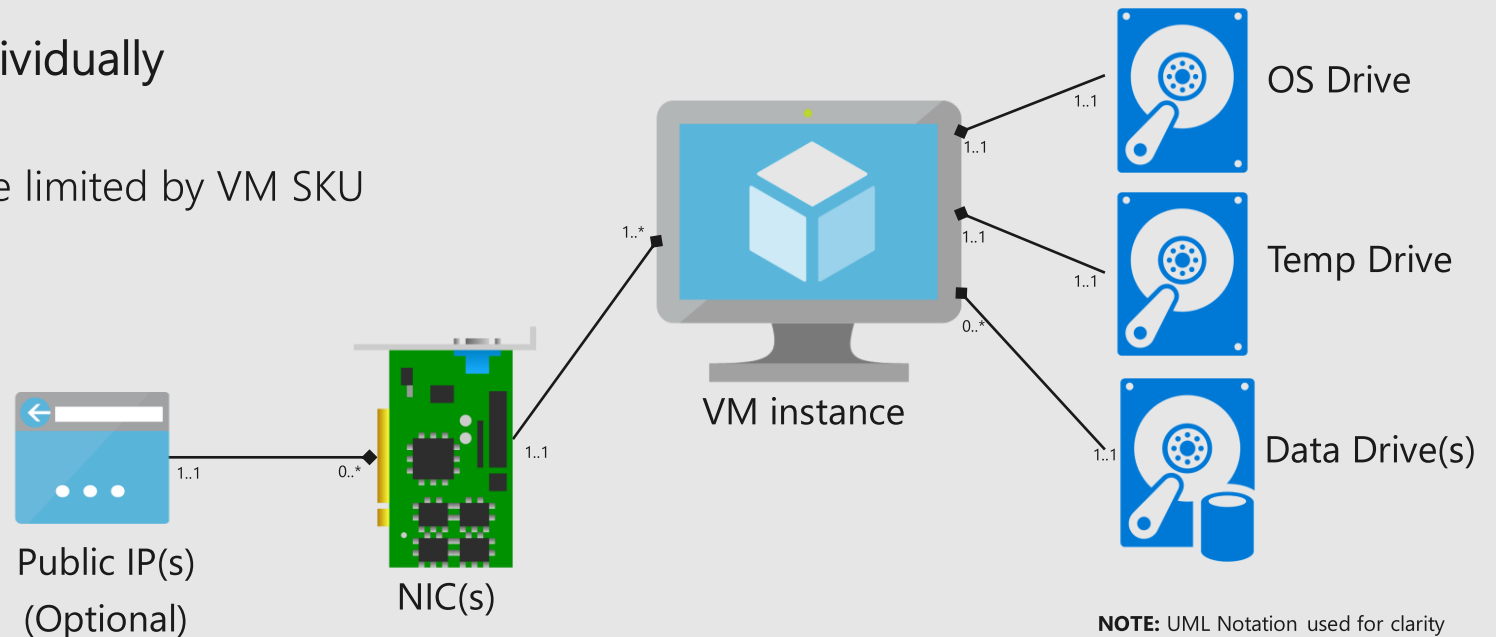
Compute

Compute options for all types of apps



Virtual Machine itemization

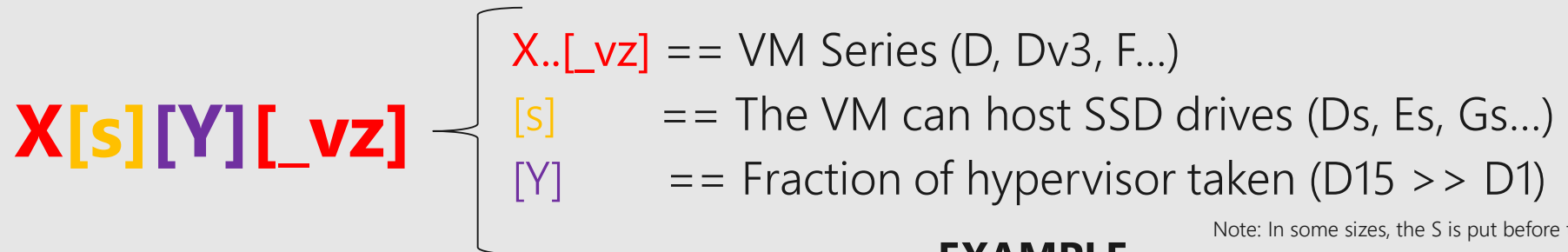
- Virtual machines are charged according to its size and usage
 - The bigger the more expensive
 - The more special the more expensive (GPU cards)
 - The more time of use, the more expensive. Development environments normally don't need to be running 24/7
- Temp Drives are for free (included in VM Price)
- OS drives are charged
- Data drives are optional and charged individually
 - Managed disks is the recommended way
 - Number of Data disks, IOPS and MB/s are limited by VM SKU
- NICs are free
- Public IPs are charged
 - Basic SKU (Static or Dynamic)
 - Standard SKU (Static)
 - Secured by default
 - Zone redundant



NOTE: UML Notation used for clarity
a..b means from a to b
* means many
1..* means "possibly from 1 to many"

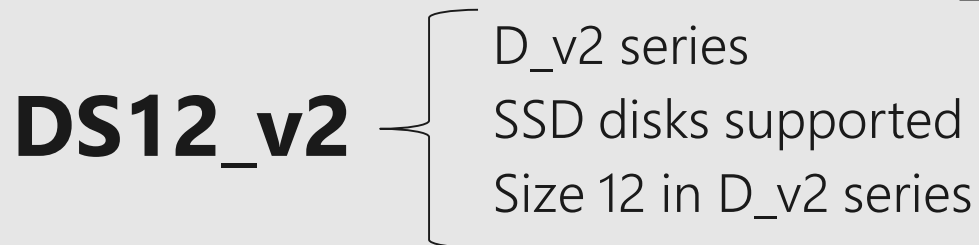
Azure VM Size Naming (Old)

- VM types are grouped in series (A, B, D, E, F...)
- Each series indicate:
 - CPU to RAM ratio (Compute or memory optimized)
 - Processor generation family
 - Special features (GPU cards, burstable usage)
- If the VM is SSD capable its compute Price is the same than the non-SSD capable counterpart
 - If you want to use Premium disks, make sure you select VM with "s" in the name
- In a given VM family, latter versions are cheaper (e.g. Dv3 is cheaper than Dv2)
- For SAP loads, selected sizes that are certified



Note: In some sizes, the S is put before the fraction (DS13v2 vs E32S)

EXAMPLE



Azure VM Size Naming (New)

E64i_v3 NC24r_v3

<Family> [Sub-family] <#> [m][r][s]...[_v#]

Family series indicates target workload.

Number of vCPUs in the VM

Optional sub-family further differentiates workloads (e.g. NC for GPU Compute; NV for GPU Visualization)

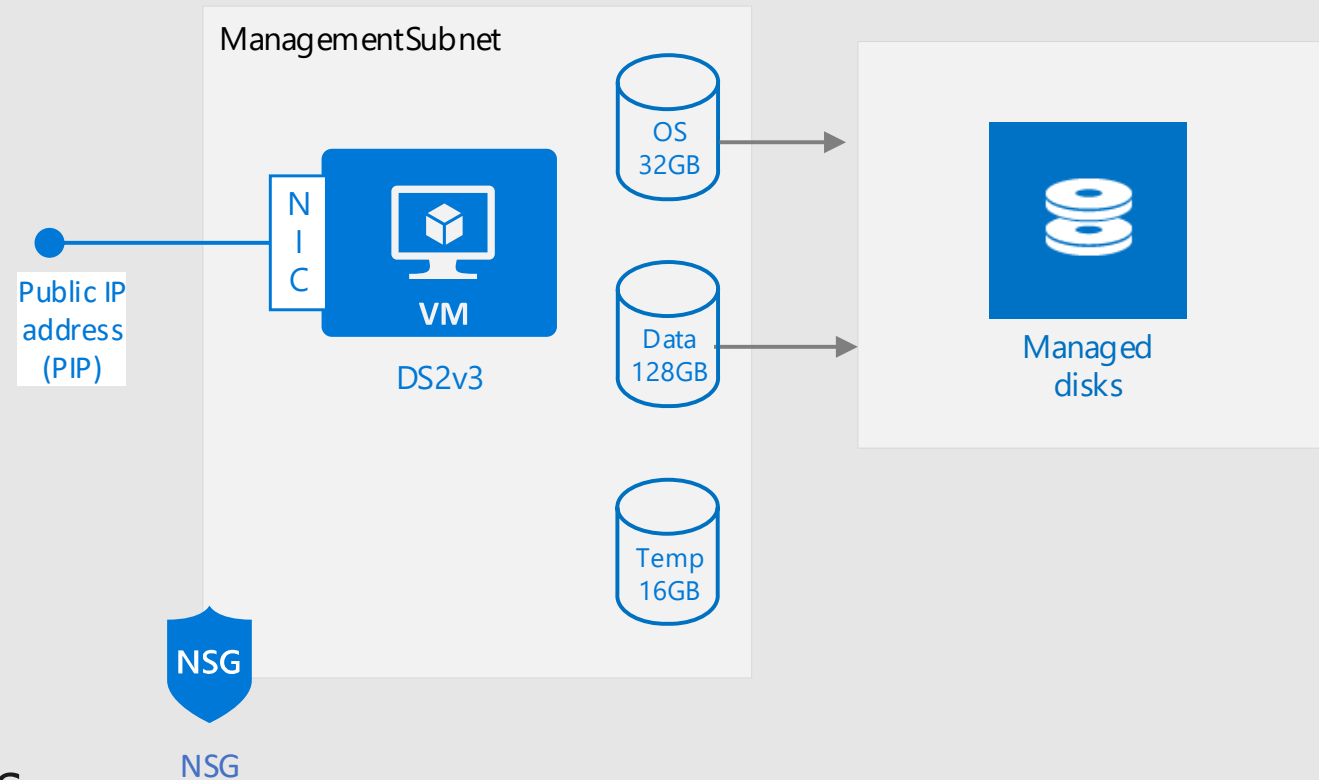
One or more **additive features**:

- d = Disk, local are present
- h = Hibernation capable
- i = Isolated
- l = Low memory
- m = Memory intensive
- n = NVMe
- t = Tiny memory
- r = RDMA
- s = Premium Storage capable

Version # of family, incremented with 10%+ performance improvements

Virtual Machine cost items

- VM type and hours
- OS disk type and size*
- Data disk type and size*
- Public IP address type and hours



*more info in Storage section

Storage

Azure provides a unified distributed storage system offering durability, encryption at rest, strongly consistent replication, and auto load-balancing

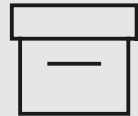
Secure, scalable, and highly available storage options for every use case



Disk storage

Ultra
Premium
Standard

Reliable, persistent, high performing storage for Virtual Machines



Object storage

Azure Blobs

Secure, centralized storage target for backup/disaster recovery



File storage

Azure Files
Azure NetApp Files

Lift and shift of legacy applications that require file shares to the cloud



Data transport

Azure Import/Export
Azure DataBox

Move or migrate data into Azure



Hybrid storage

Azure StorSimple
Azure File Sync
Avere*

Secure, intelligent data tiering between on-premises and cloud storage

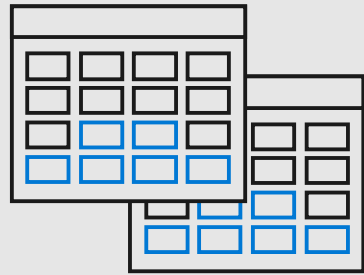
Azure storage resiliency solutions

Azure storage provides replication options based on availability needs

Storage	Local/zone/Geo-redundant storage
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LRS

99.999999999% (11 9s)

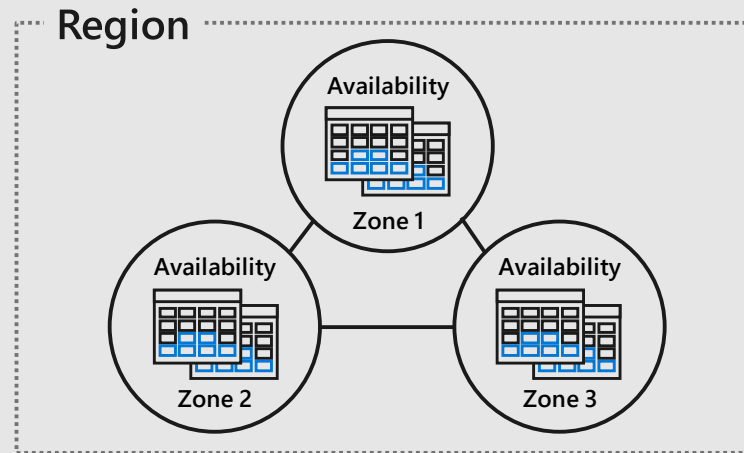


Locally redundant storage

The simplest, low-cost replication strategy that Azure Storage offers

ZRS

99.9999999999% (12 9s)

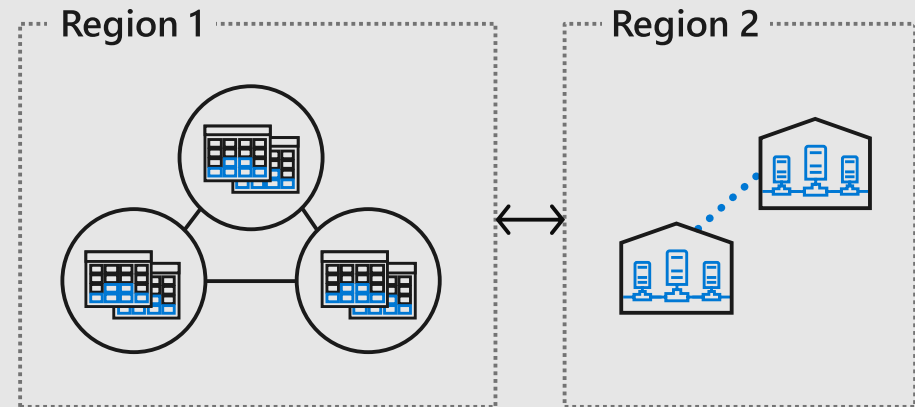


Zone-redundant storage

A simple option for high availability and durability

GRS

99.99999999999999% (16 9s)



Geo-redundant storage

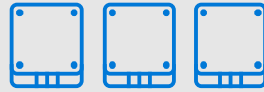
Cross-regional replication to protect against region-wide unavailability

Virtual Machine Disk Storage

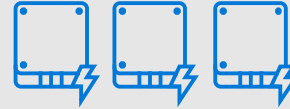


Standard HDD

Now GA



Standard SSD



Premium SSD

Preview (NEW)



Ultra SSD

Low-cost storage

Consistent performance

High performance

Sub-millisecond latency

SIZE

32TiB

32TiB

32TiB

64TiB

IOPS

2,000

2,000

20,000

80,000 – 160,000

BANDWIDTH

500 MBps

500 MBps

750 MBps

2,000 MBps

Single disk max value

Managed disks vs Unmanaged disks

- Unmanaged disks (aka Page Blobs)
 - Old way of provisioning disks
 - You have to manage the underlying storage accounts
 - You have to balance the load among storage accounts
 - Make sure you don't hit any scalability limits
 - Available in LRS, ZRS, GRS and RA-GRS (Standard HDD only)
- Managed disks
 - Storage account creation/management is handled for you
 - No scalability concerns
 - Only available in LRS
 - By default, always go with Managed Disks

Managed Disks cost components

- Standard HDD (S-series)
 - Size
 - Storage transactions
- Standard SSD (E-series)
 - Size
 - Storage transactions
- Premium SSD (P-series)
 - Only size (fixed price per month)
 - NOTE: Premium SSD can be cheaper than Standard SSD with very high number of transactions



Azure Files

Lift and shift

Variety of clients/protocols

SMB 2.1, 3.0, REST

Windows, Linux, macOS

Azure and on-premises access

Secure

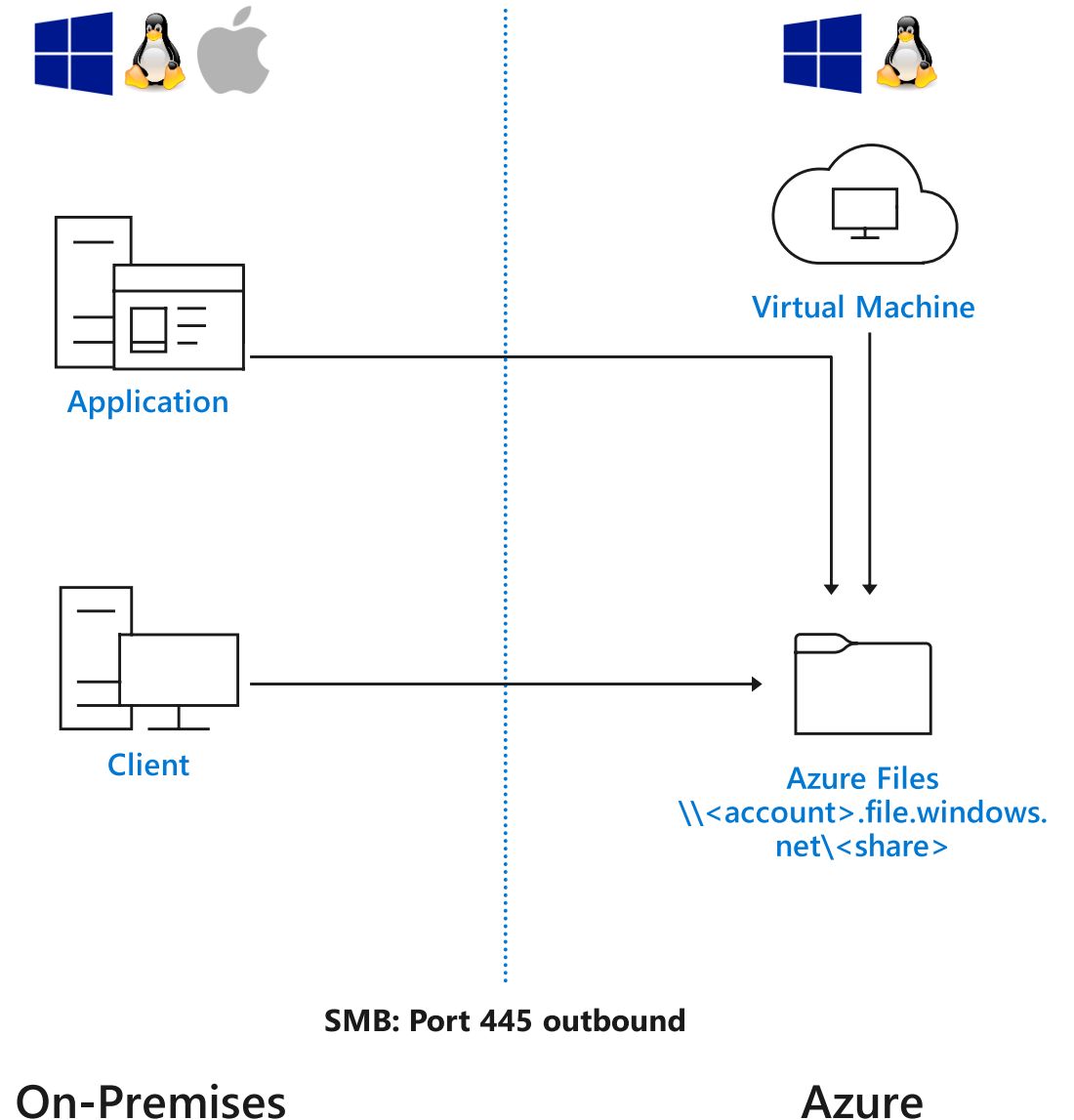
Encryption at rest

Secure communication over SMB

Cost components

Redundancy option (LRS, ZRS or GRS)

Operations and data transfer



Azure NetApp Files



GA
ETA
Q1 2019

Azure Storage has been rapidly adding capabilities to address the increasing footprint & needs of enterprise applications. The most important service coming on-line in the near term is the addition to Azure's file storage capabilities : Azure NetApp Files, a result of a strategic partnership announced with NetApp in September 2017.

- **ANF – a bare-metal (tycoon) service** powered by No 1 Storage OS powering file-based systems : NetApp ONTAP. NetApp is the dominant player enterprise Linux/NFS apps.
- **Game-changer** for migrating, managing, and running Linux & Windows based enterprise file workloads in Azure: general business, mission-critical apps, Databases and more. Post GA – additional capabilities on the roadmap include connectors to Azure premium services like HD Insights, and certification for SAP HANA
- **Benefits:** Low latency, Rich data management, Minutes to set-up, MS + NetApp supported, No App modification | Consume against EA

The screenshot shows the Azure portal interface for a NetApp Files resource. The top navigation bar includes 'Preview', 'Microsoft Azure', and 'Restore default configuration'. The breadcrumb path is 'Home > Azure NetApp Files'. The main heading is 'Azure NetApp Files' with the provider 'Microsoft'. Below this, there are action buttons: '+ Add', 'Edit columns', and 'Refresh'. A 'Subscriptions' section shows '1 of 5 selected' and a search box containing 'Test-AzureNetAppFiles'. Below the search box, it indicates '1 items' and a table header with a checkbox and the text 'NAME' with a sort arrow. The table content shows one item: a checkbox, the NetApp icon, and the text 'Test-AzureNetAppFiles'. The left sidebar contains a navigation menu with options: 'Create a resource', 'All services', 'FAVORITES', 'Azure NetApp Files', 'Dashboard', 'All resources', 'Resource groups', 'App Services', 'SQL databases', 'SQL data warehouses', 'Azure Cosmos DB', 'Virtual machines', 'Load balancers', and 'Storage accounts'.

Object storage for every use case

Azure Blob



Hot

Frequently
accessed data



Cool

Less frequently
accessed data



Archive

Rarely
accessed data



Per TB
per month

\$18.40

\$10.00

\$2.00



Per 10k write
operations

\$0.05

\$0.10

\$0.10



Retrieval
times

Immediate

Immediate

Hours

Use cases

Cloud native application
data storage

Repository for
server backups

Medical records
archiving

Storage Account types

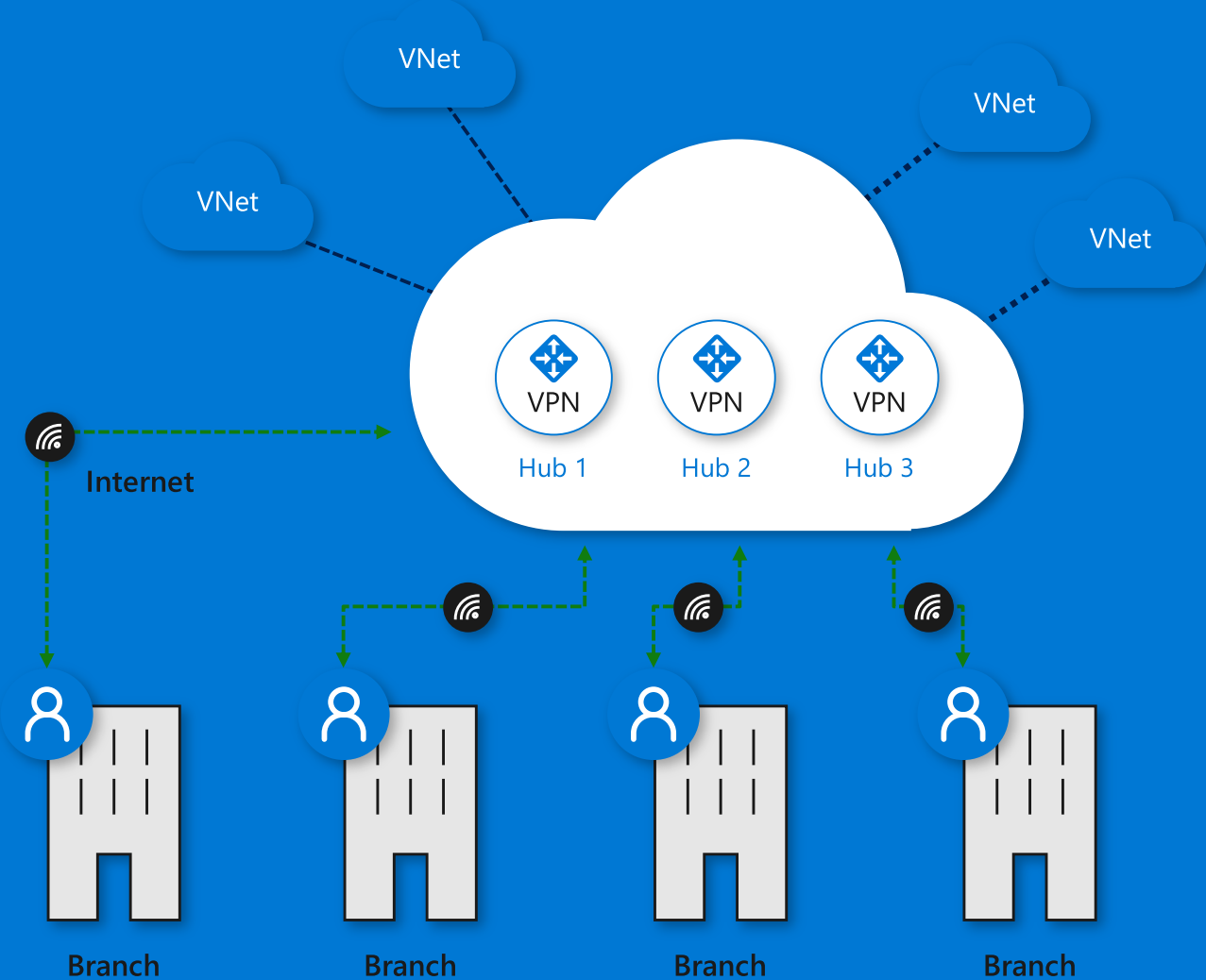
Type	Services	Performance Tiers	Access Tiers	Replication options
General Purpose v1	Blob, File, Queue, Table, and Page Blobs	Standard, Premium	N/A	LRS, GRS, RA-GRS
General Purpose v2	Blob, File, Queue, Table, and Page Blobs	Standard, Premium	Hot, Cool, Archive	LRS, ZRS, GRS, RA-GRS
Blob	Blob only	Standard	Hot, Cool, Archive	LRS, GRS, RA-GRS
Premium Blob*	Blob only	Premium	N/A	LRS

- GPv1 have the lowest access charges by far. Recommended as destination of ASR and diagnostics accounts
- GPv2 and Blob storage accounts to be used when you can control tiering. Also look at automated tiering in preview

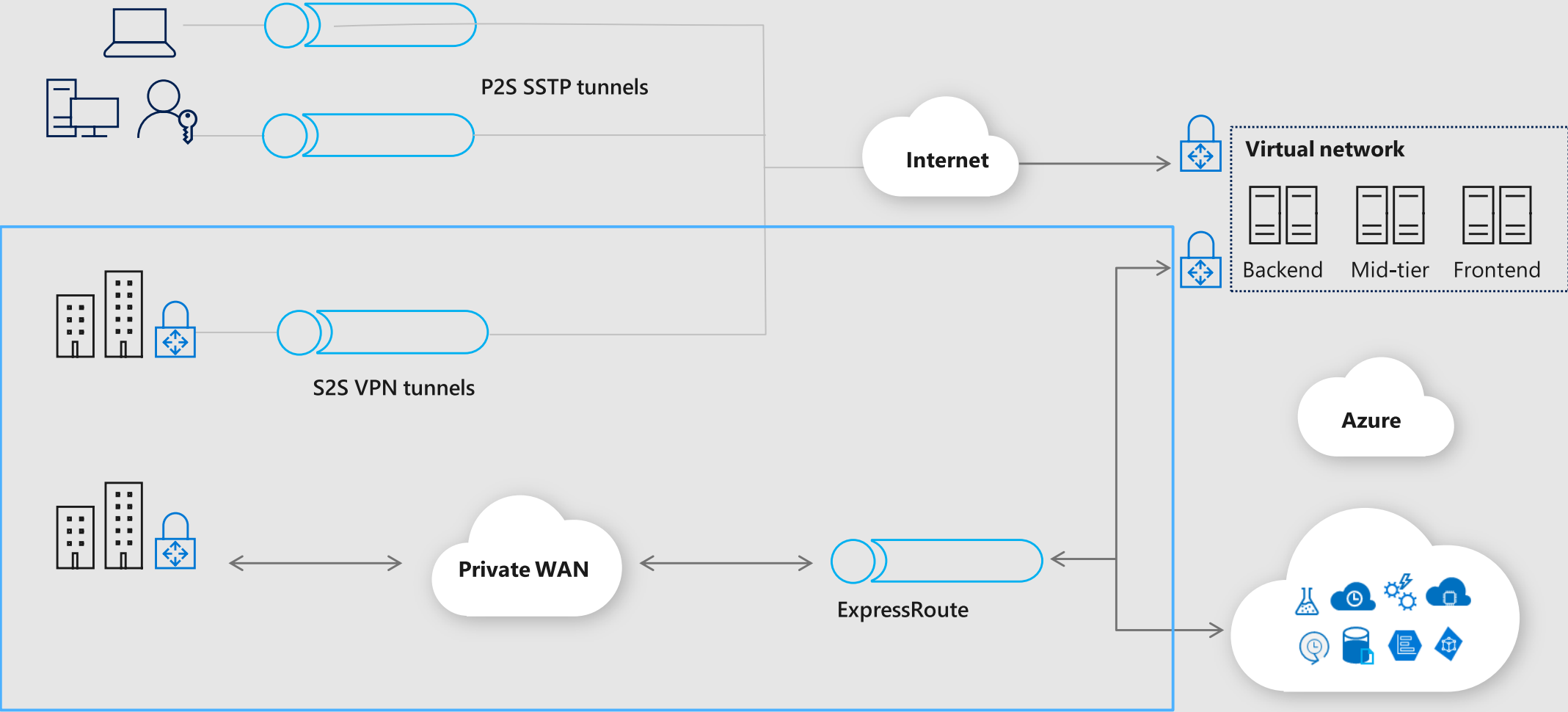
Storage account cost components

- Service: Blob, File, Queue, Table or Unmanaged Disks
- Storage account type: GPv1, GPv2, Blob or Premium Blob*
- Resiliency: LRS, ZRS, GRS or RA-GRS
- Access Tier: Hot, Cool or Archive
- Operations and data transfers
- Used capacity in GB

Networking



Connectivity options



Main cost components



Bandwidth



Data transfer



Gateway



Service Provider

Bandwidth



- S2S VPN: depends on Gateway SKU: 100Mbps – 1.25Gbps
- ExpressRoute: 50Mbps – 10Gbps
- ExpressRoute Direct: 100Gbps (in preview)

Data Transfer



- Only data transfer out is billed, inbound is free
- Data transfer price determined by zone:
 - Zone 1: US West, US East, US North Central, US South Central, Europe West, Europe North, France Central, France South
 - Zone 2: Asia Pacific East, Asia Pacific Southeast, Japan East, Japan West, India South, India West, India Central
 - Zone 3: Brazil
- Express Route has two options:
 - Metered: data transfer out billed separately
 - Unlimited: includes all data transfer out

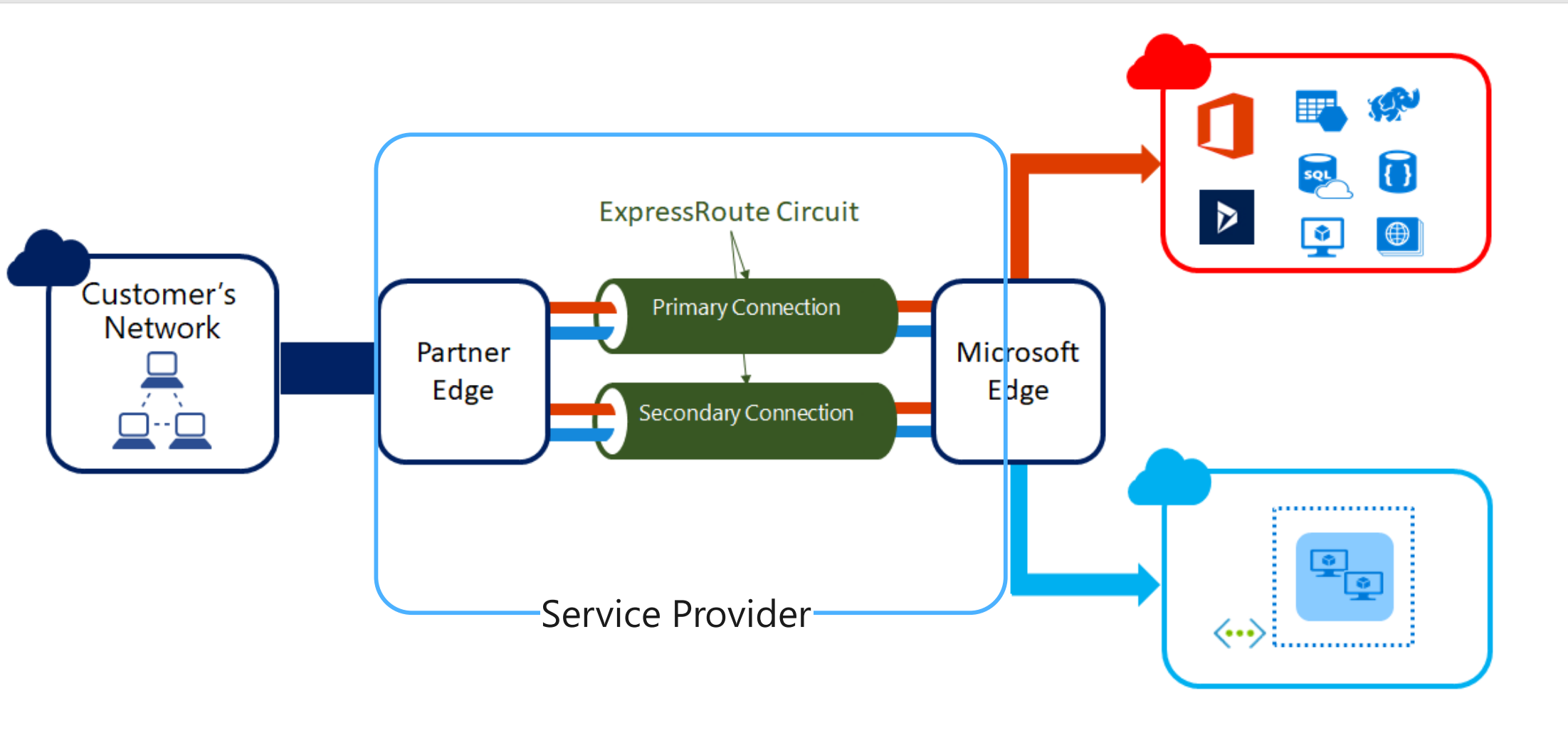
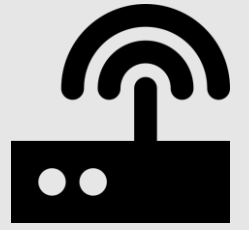
Gateway



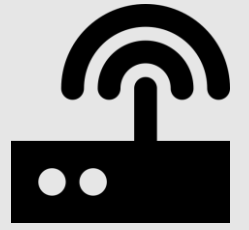
- **Two gateway types:**
 - VPN Gateway – for connecting S2S or P2S
 - ExpressRoute Gateway – for ExpressRoute

- **Separate SKUs for Availability Zones**
 - VpnGw#AZ
 - ErGw#AZ

ExpressRoute Service providers



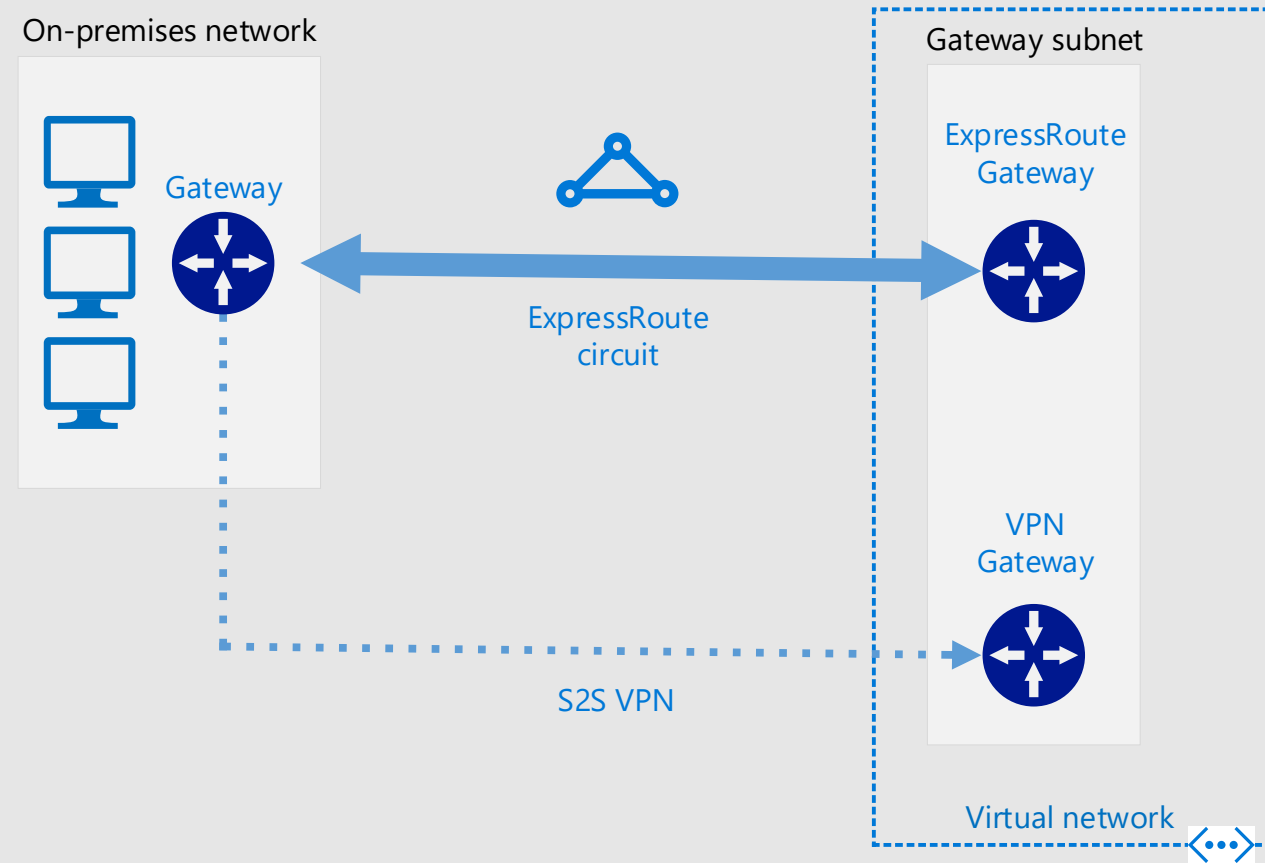
Service Provider



- Service providers
 - Equinix, Interxion, Colt, BT, Telefonica, Telenor, Orange etc. etc.
 - <https://docs.microsoft.com/en-us/azure/expressroute/expressroute-locations-providers>
- Service provider costs not included in ER price
- Generally made up of 2 components:
 - Setup costs (1 time)
 - Monthly fee depending on bandwidth

Example of networking costs

- **Input:**
 - ER: 500Mbps, 'standard gateway'
 - S2S VPN 100Mbps, 'VpnGw1'
 - Data transfer out: 6TB per month (zone 1)
 - Always on, 730 hours per month
 - Region: West Europe



Example of networking costs

Service type	Description	Estimated Cost
ER Gateway	ExpressRoute Gateways type, Standard tier, 730 gateway hour(s)	€116.97
ExpressRoute	Metered data plan, 500mbps port speed, Zone 1	€244.56
Additional Outbound data transfer	6 TB additional data transfer out	€159.53
VPN Gateway	VPN Gateways type, VpnGw1 tier, 730 gateway hour(s)	€116.97
Monthly Total		€638.02
Annual Total		€7,656.26
Licensing Program		Microsoft Online Services Program (MOSP)

Security & Management

Azure Security & Management



Governance

Proactively apply policies and optimize cloud spend



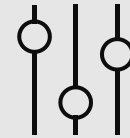
Security

Industry leading Security with Advanced Threat Protection



Resiliency

High availability and protection for VMs, apps and data



Monitoring

Deep operational insights with rich intelligence



Automate

Powerful scripting, configuration and update management

Azure Backup

- Service that backs up data to the Microsoft Azure cloud
- Several components: DPM, Azure Backup Server, MARS agent and **Azure IaaS Backup**
- Azure IaaS Backup is always incremental after the first full backup

How to quote Azure Backup

Backup for Azure VMs and on-premises servers

Prices listed below are applicable when using any of the following components to backup your VMs or physical servers – Azure IaaS VM Backup, Azure Backup (MARS) agent, System Center DPM, or Microsoft Azure Backup.

The size of the backed-up data determines the data size for Azure Backup in each protected instance before compression and encryption.

- For virtual machines, the size of the ~~allocated~~ ^{used} disk determines the data size.
- When backing-up files and folders, the size of the files and folders configured for backup determine the data size.
- When backing-up SQL Server, the size of the databases configured for backup determine the data size.

You have the flexibility to choose between locally redundant storage (LRS) or geo-redundant storage (GRS). Both LRS and GRS are Block Blob Storage. Charges for storage are separate from the cost of Azure Backup.

SIZE OF EACH INSTANCE	AZURE BACKUP PRICE PER MONTH
Instance < or = 50 GB	€4.217 + storage consumed
Instance is > 50 but < or = 500 GB	€8.433 + storage consumed
Instance > 500 GB	€8.433 for each 500 GB increment + storage consumed

Example: If you have 1.2 TB of data in one instance, then the cost would be €25.30 plus storage consumed. You would be charged €8.44 for two 500 GB increments and €8.44 for the remaining 200 GB data.

Azure Backup example

- Virtual machine with the following disks:

Disk type	Max size	Actual data present
OS disk	4095 GB	17 GB
Temporary disk	135 GB	5 GB (not included for backup)
Data disk 1	4095 GB	30 GB
Data disk 2	4095 GB	0 GB



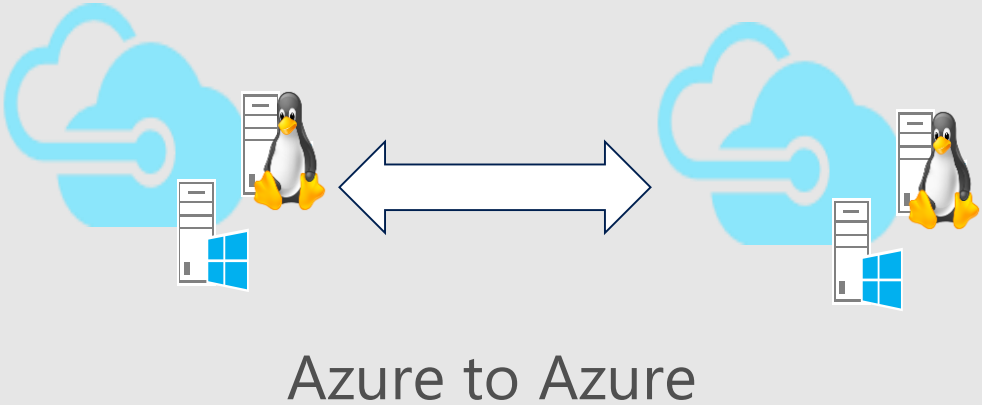
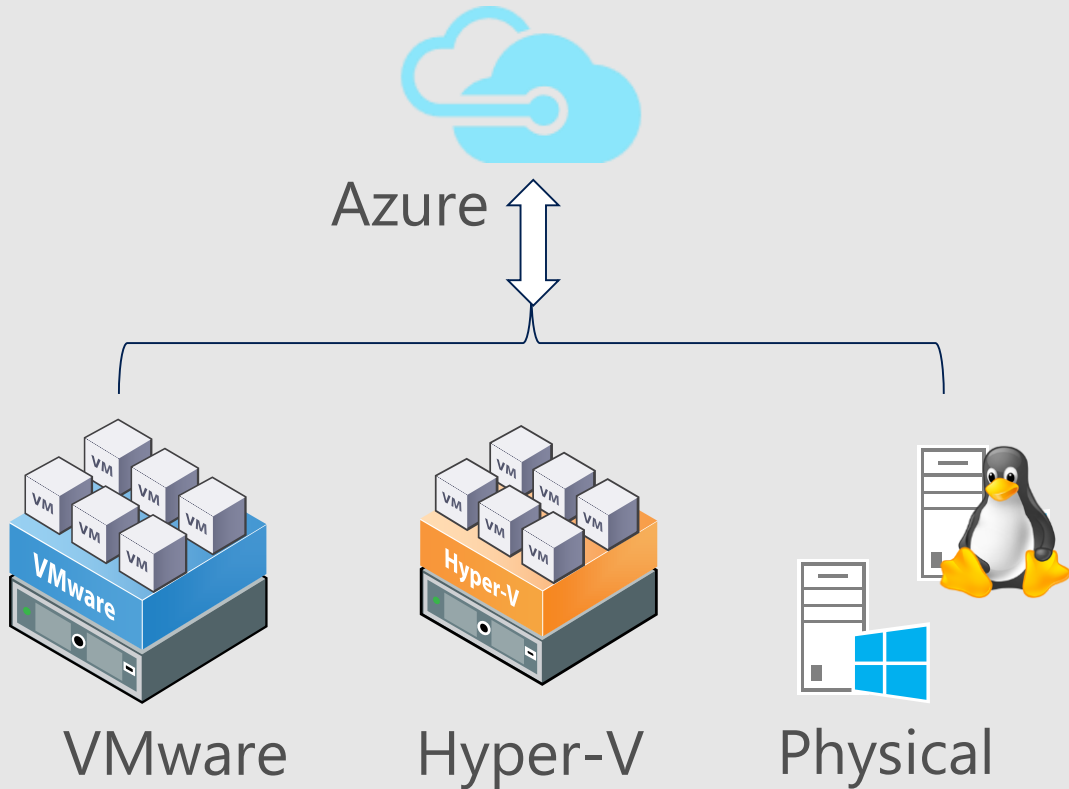
- The actual size of the VM virtual machine in this case is $17 \text{ GB} + 30 \text{ GB} + 0 \text{ GB} = 47 \text{ GB}$
- Storage consumed in the recovery service vault is paid separately
- Retention periods.** Depending on how much time you keep your backups, you will accumulate more or less storage in your Recovery Services Vault

Azure Site Recovery: The Complete Migration & Disaster Recovery

Private cloud to Azure

Any Cloud

Azure to Azure



 Windows

Any OS

 Linux

How to quote Azure Site Recovery (I)



Pricing details

Azure Site Recovery is billed based on number of instances protected. Every instance that is protected with Azure Site Recovery is free for the first 31 days, as noted below.

	PRICE FOR FIRST 31 DAYS	PRICE AFTER 31 DAYS
Azure Site Recovery to customer owned sites	Free	€13.50/month per instance protected
Azure Site Recovery to Azure	Free	€21.09/month per instance protected

Azure Site Recovery between Azure regions is charged at the same rate as Azure Site Recovery to Azure.

Azure Site Recovery is billed in units of the average daily number of instances you are protecting over a monthly period. For example, if you consistently protected 20 instances for the first half of the month, and none for the second half of the month, the average daily number of protected instances would be 10 for that month.

How to quote Azure Site Recovery (II)

What charges do I incur while using ASR?

- ASR license (previous slide)
- Azure Storage
 - If target storage account is standard, just used capacity (Unmanaged disks and page blobs price)
 - If target storage account is premium, provisioned capacity (Unmanaged disks and page blobs price)
 - No disks are created until a test failover or a failover (Managed disks price)
- Storage transactions. These charges are negligible
- Outbound data transfer. When doing failback or when doing Azure2Azure. ASR uses compression for egress traffic (40% to 80% reduction)

ASR quoting examples

Example: VM replicating to standard storage with 32 GB OS disk and 250 GB data disk:

- During replication: Storage charges under the category of "Unmanaged disks and page blobs" for standard storage are incurred.
- During a failover to managed disks: The size of the disks (32 GB and 250 GB) will be rounded off to the nearest standard managed disk size of S4(32 GB) and S15(256 GB).

Example: VM replicating to premium storage with 128 GB OS disk and 500 GB data disk

- During replication: Storage charges under the category of "Unmanaged disks and page blobs" for premium storage disk sizes P10 and P20 are incurred. The size of the disks being replicated (128 GB and 500 GB) are rounded off to the nearest unmanaged premium disk size of P10(128 GB) and P20(512 GB) for billing.
- During a failover to managed disks: Managed disk charges for premium managed disks of sizes P10 and P20 apply.



Azure Monitor

Application

Operating System

Azure Resources

Azure Subscription

Azure Tenant

Custom Sources



Insights



Application



Container



VM



Monitoring Solutions

Visualize



Dashboards



Views



Power BI



Workbooks

Analyze



Metrics Explorer



Log Analytics

Respond



Alerts



Autoscale

Integrate



Event Hubs



Logic Apps



Ingest & Export APIs

Improving security across hybrid cloud environments



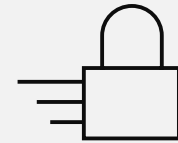
Azure Security Center



Strengthen security posture



Protect against threats



Get secure faster

How to quote Azure Monitoring, Security

- Azure Monitor (former OMS)

- Queries and Alerts

- # of alerts created for metric signals
 - # of alerts created for log signals (5, 10 or 15 min frequency are charged differently)
 - API calls and Notifications out of allowance

- Log Analytics

- Charged by amount of data stored in Log Analytics workspace (first 5GB are free)
 - Average VM ingests between 1 and 3 GB of data per month
 - Default retention is 31 days. Additional days are charged at \$0,10/GB

- Azure Security Center

- Free and Standard Tiers

- Standard is charged by VM/hour, App Service/hour, SQL DB/hour, MySQL/hour, etc.



Optimize pricing and licensing

Contractual models

- **Web Direct (credit card)**
 - Available through the Azure portal
- **EA**
 - The Customer has already a contractual commitment with Microsoft
 - Partners can earn Benefits by associating the partner ID to a subscription (DPOR)
- **CSP**
 - CSP price is discounted from web prices
 - CSP partner can apply a margin on top of MS discount
 - Rebates based on actual consumption

VM Procurement models

- **Pay as you go (PAYG)**
 - The taximeter model
 - Charged per minute
 - 1:24:46 hours == 1:24 hours to be charged
- **Reserved Instances (RI)**
 - 1 or 3 years commitment, longer commitment ⇒ lower price
 - Upfront payment for full year(s) usage
 - Very high discounts, up to 72% compared to PAYG

Typical savings with RI



Base VM pay-as-you-go price

Azure RI price

Reserved Instance, RI

- 1 or 3 year period
- Upfront payment
- Exchange to a different SKU
- Cancel at any time (12% cancellation fee over remaining balance)
- Example:
 - RI offering has 45% discount, PAYG will be cheaper if used less than $100-45\%=55\%$ of the time

Easy purchase experience

Create reservation

Reservations provide you a significant discount over on demand Virtual Machines prices by allowing you to pre purchase the base costs of your virtual machine usage for a period of 1 or 3 years. Additional software costs will still apply. [Learn more about Azure Reservations](#)

BASICS

* Name

* Subscription

Scope ⓘ Shared Single subscription

DETAILS

* Location

* VM size (View full pricing details)

Term

* Quantity

Select:

→ Region

→ VM Size and Quantity

→ Term

By clicking "Purchase", I acknowledge that I have read and agreed to the [legal terms regarding Azure Reservations](#) and the [legal terms regarding the Azure Marketplace](#).

Purchase

Integrated into the Azure portal experience

Best practices

- PAYG for QA, DEV/Test
- RIs for always-on (Production)
- In elastic loads
 - RIs for base load
 - PAYG for peaks
- Different regions might have different prices. Double check where you put the VMs

License discounts

- Windows Server and SQL Server Subscriptions: 1-year or 3-year licenses (CSP only)
- Azure Hybrid Benefit: re-use existing WS licenses under Software Assurance or Windows Server Subscriptions → Up to 49% savings
- SUSE Linux Subscriptions

INSTANCE:
D2 v3: 2 vCPU(s), 8 GB RAM, 50 GB Temporary storage, \$0.126/hour

Billing Option

Save up to 72% on pay-as-you-go prices with 1-year or 3-year Reserved Virtual Machine Instances. Reserved Instances are great for applications with steady-state usage and applications that require reserved capacity. [Learn more about Reserved VM Instances pricing.](#)

Pay as you go
 1 year reserved (~14% savings)
 3 year reserved (~29% savings)

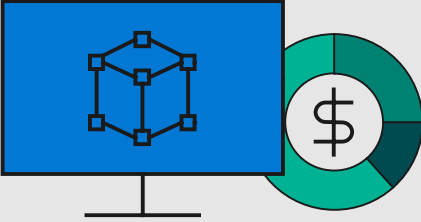
Save up to 47% with [Azure Hybrid Benefit](#) from Windows Server Licenses you already own, or from 1 year or 3 year subscriptions.

Use existing licenses you already own
 1 year subscription
 3 year subscription

1
Virtual machines

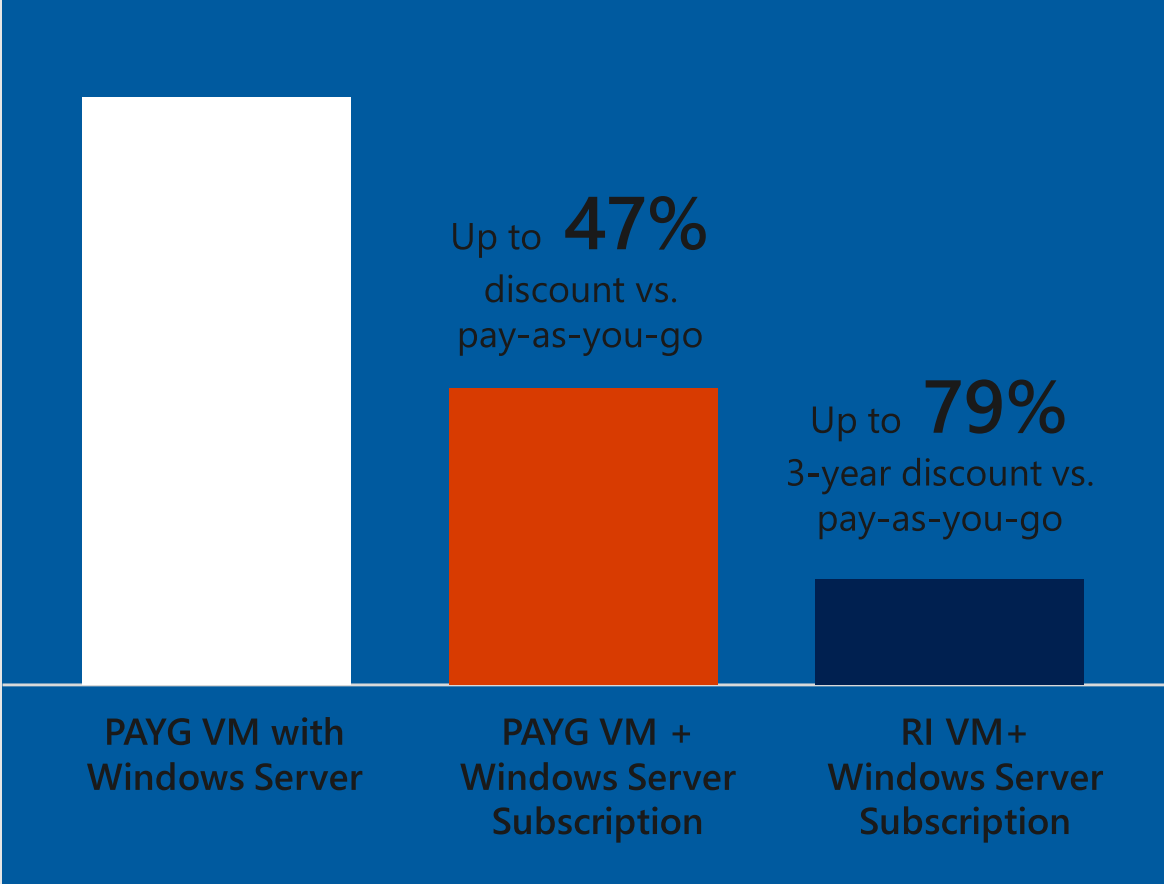
\$48.94
Effective cost per month
Licensing program: CSP
Resource ID: 23d721f3-3f2c-440f-98d8-08a3f30a80ba
Reservation will be charged upfront for the entire 3 year duration
(~62% savings)

Save Money on WS Compute with RI + WS Subscription



Save up to **47%** with Windows Server Subscription

Save up to **79%** with the Windows Server Subscription combined with RI



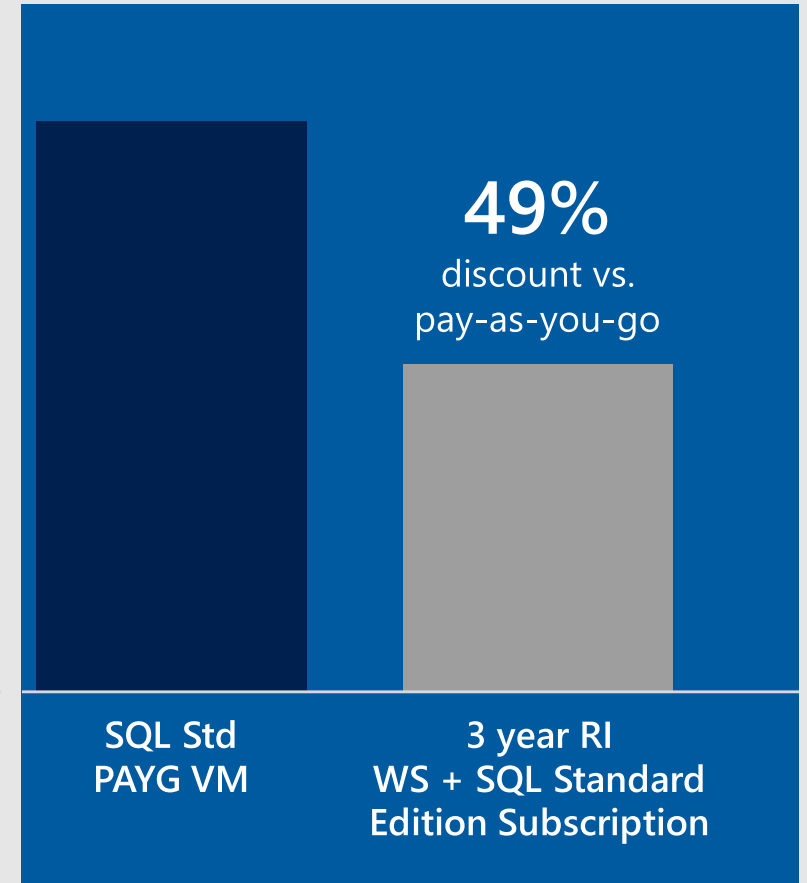
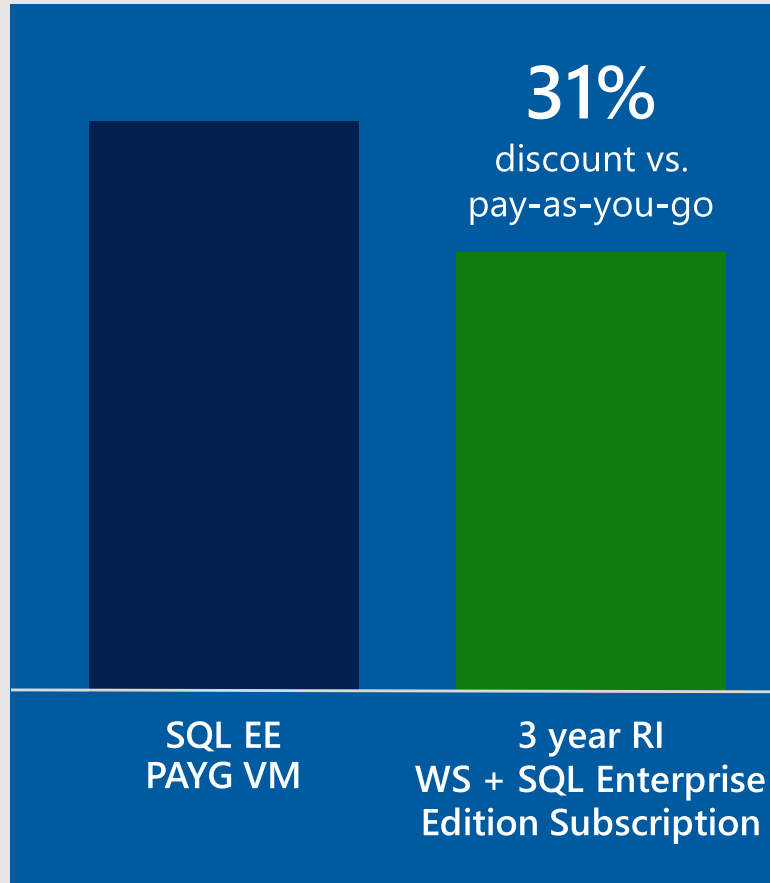
Note: Savings based on 8-Core D8 v3 VM in East US 2 region.. Actual savings may vary based on region, instance size and compute family. Prices as of June 5 2018, subject to change.

Hybrid Use Benefit Stacks for SQL and WS

SQL Enterprise Edition

SQL Standard Edition

Save up to **49%**
on a SQL IaaS VM
by stacking savings
through an Azure RI
+ Windows Server
+ SQL Subscription



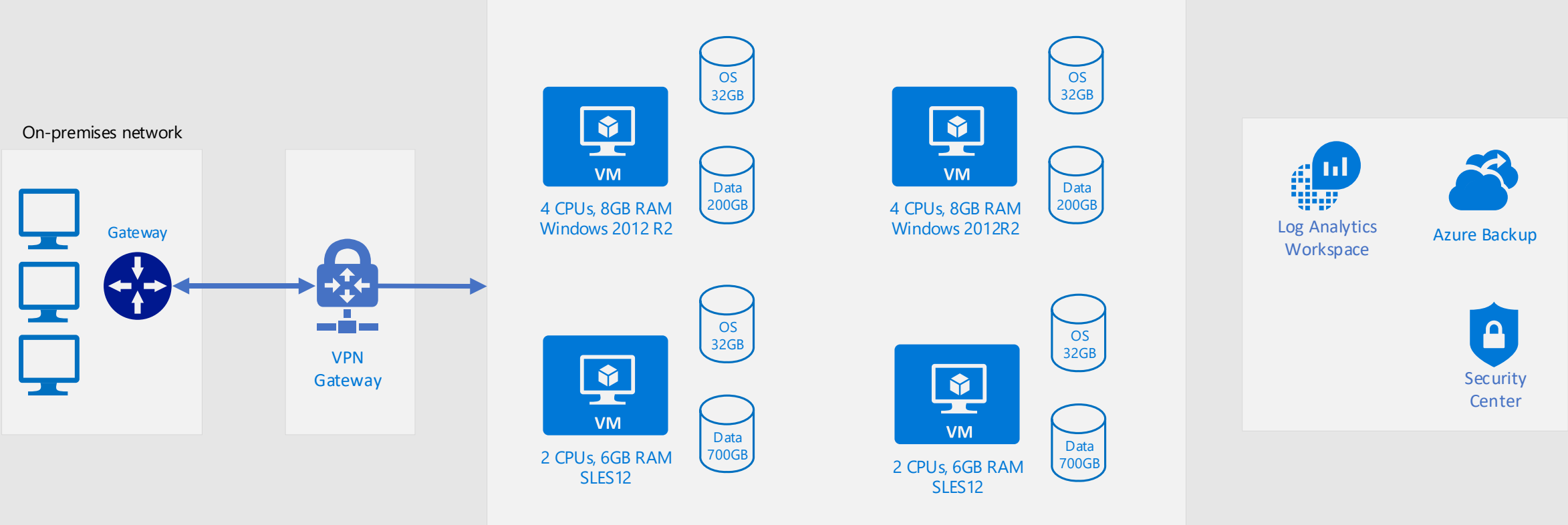
Note: Savings based on 8-Core E8 v3 VM in West US 2 region. Actual savings may vary based on region, instance size and compute family. Prices as of June 5 2018, subject to change.

Quoting Tools and example

Quoting tools

- Azure Pricing Calculator: <https://azure.microsoft.com/en-us/pricing/calculator/>
- VM Chooser: <http://www.vmchooser.com>
- Azure Pricer: <https://github.com/SeryioGonzalez/azure-pricer>
- Azure Price Calculator: <https://azprice.info/>

Quoting exercise diagram



Quoting Exercise details

- 2 x Windows 2012R2, 4 vCPUs, 8 GB RAM, 200 GB SSD, 24/7 uptime
- 2 x Linux SLES12, 2 vCPUs, 6 GB RAM, 700 GB HDD, 8/5 uptime
- Network Access via VPN S2S. No public IPs. Bandwidth 500 Mbps
- Backup needed. Retention policy. 7 daily, 2 weekly, 1 monthly, 1 yearly
- Disaster Recovery needed
- Monitoring + Security for all VMs. Data retention 2 months



Thank you!

ευχαριστώ Salamat Po متشكراً شكراً Grazie

благодаря ありがとうございます Kiitos Teşekkürler 谢谢

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Hvala Köszönöm Tak Dank u Wel ДЯКУЮ Tack

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多謝晒 Ďakujem תודה நன்றி Děkuji 감사합니다