



# SAP on Azure

## Planning Azure for SAP workloads

Tuesday, October 6th, 2020

10am – 11 am SGT

Ravi Gangampali  
Microsoft APAC

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# SAP on Azure Partner Enablement

Module One – Week Three

Day 2 – Planning Azure for SAP workloads



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Cloud Solution Architect



**Ravi Gangampalli**  
Cloud Solution Architect – SAP on Azure

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# Agenda

Utilize Azure for SAP workloads reference architecture

Planning for implementing SAP solutions on Azure

Prepare to migrate SAP workloads to Azure

# Check-in

We are happy to host you 😊

<https://aka.ms/apac-enablement-check-in>



# Management & Security

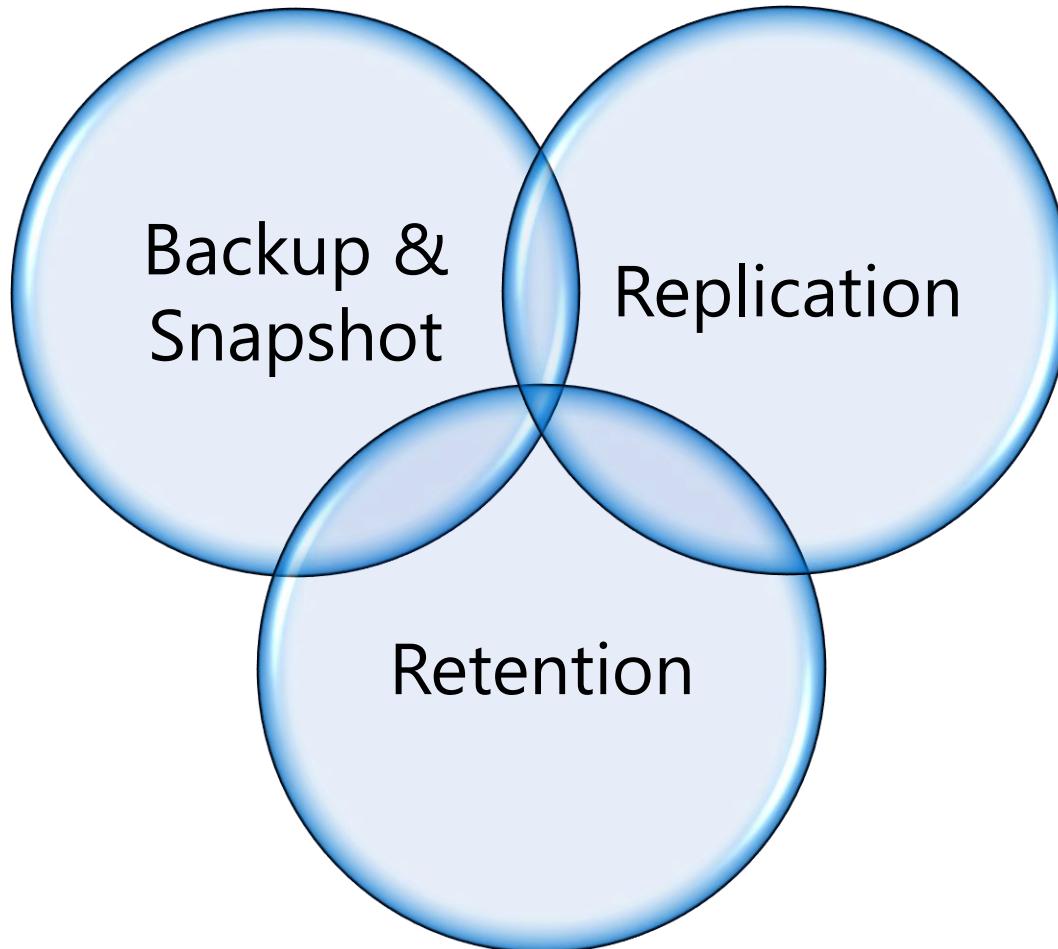
Continuation to Intro Session

Accelerate | Connect | Excite



# Data Protection Strategies

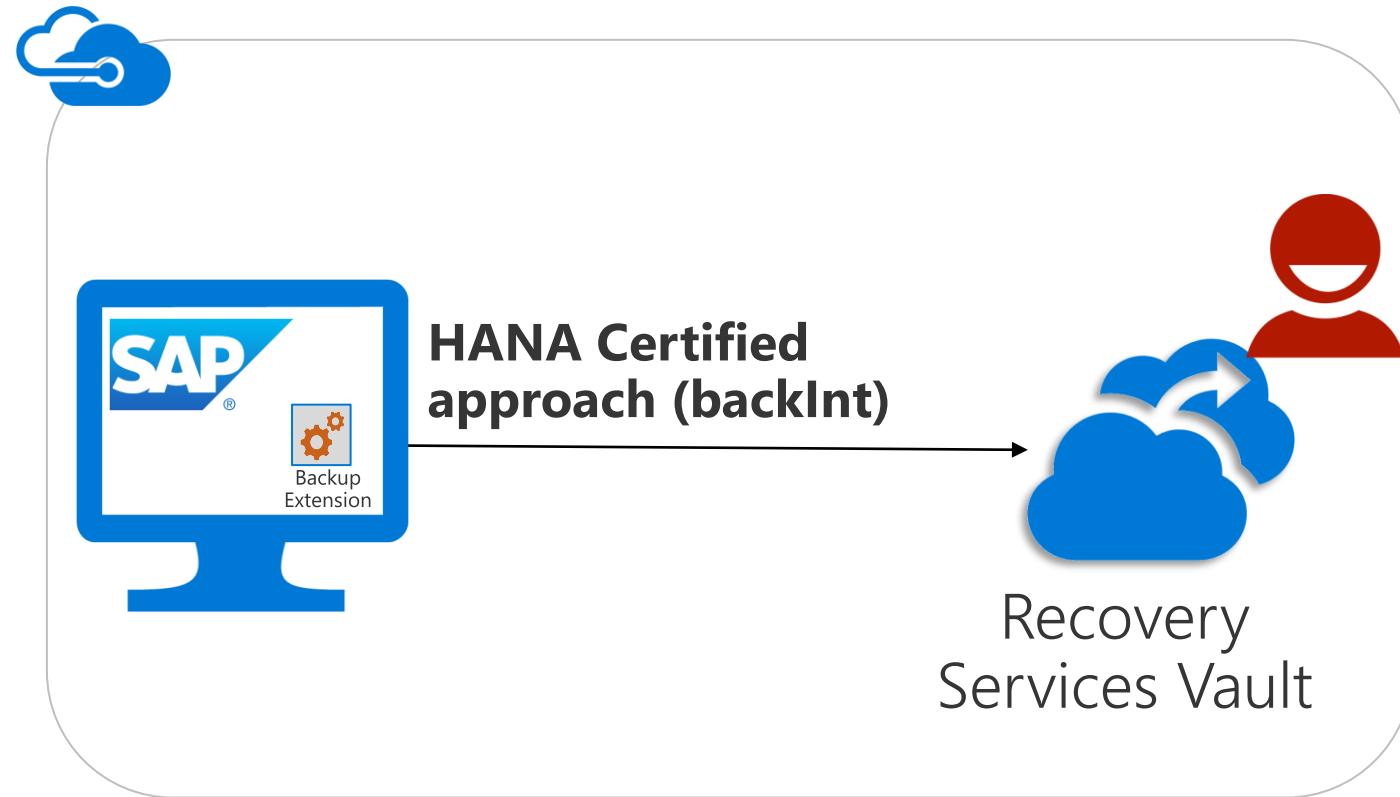
1. Database backup
2. File backup
3. VM/system backup
4. Snapshot
5. and Restore



1. Database Replication
2. File replication
3. VM replication
4. Snapshot replication
5. and Failover

1. Retention to local volume or nearby VM (short term)
2. Remote copy to cloud storage (long term)
3. and Restore

# Azure Backup HANA Backint Support



Find the document [here](#)

No backup infrastructure

Enterprise scale

Central Management

15 minute RPO

True point in time restore

Long term retention

Central Customizable Reports

# SAP on Azure Backup Solutions

	<b>Standard DB backup (e.g. SQL, Oracle, HANA)</b>	<b>Azure Backup Server (=SCDPM on Azure)</b>	<b>3rd party solutions (e.g. Commvault, NetBackup)</b>	<b>Azure IaaS VM Backup</b>	<b>HANA on Azure Large Instances Storage Snapshot</b>	<b>HANA Backup using BackInt</b>
Backup type	Database	Network/Agent	Network/Agent	Snapshot	Storage level snapshot	Network/Agent
Backup target	DBs within Azure VMs	SQL Server DBs, Files and OS States (Windows) within Azure VMs ( <a href="#">link</a> )	SQL Server/Oracle/HANA, Files and OS States (Windows, Linux) within Azure VMs	Azure VMs (Windows, Linux) running SQL Server ( <a href="#">link</a> )	HANA database volume, HANA log volume, boot volume ( <a href="#">link</a> )	HANA DBs ( <a href="#">link</a> )
Linux (Guest OS) support	-	No	Yes	Yes	Yes	Yes
SQL Server database backup capability	Transaction log (every minute), differential, full	Differential every 15 minutes and full (express)	Yes	Up to 3 times per day	-	HANA database backup (log backups for every 15 mins. Support for Full, differential. Support for incremental coming soon). SQL Server ready
Oracle database backup	No	No	Yes	file consistent backup	-	No
Compression	Supported	Supported (storage sizing : <a href="#">link</a> )	Supported	None	-	None
Deduplication	Not Supported	Not Supported	Supported	Not Supported	Not Suppored	Not Supported
Backup servers running on	DB Server	Microsoft Azure Backup Server (on VM) (downloadable from Azure Portal) (VM sizing : <a href="#">link</a> )	Backup Server (on VM)	None (Backup as a Service)	-	None (Backup as a Service)
Agent software required	No	Agent in backup target VMs and Azure Backup Agent in Azure Backup Server VMs	Yes	No (* Only Azure VM Agent)	No	No (* Only Azure VM Agent)
Network bandwidth required	Yes but controllable			None	None	Yes
Short term retention	Yes (on local storage)			None	Yes (on local NFS storage)	None
Long term retention	Possible				Up to 255 snapshots per volume	Possible
Point-in-time recovery	Possible					
Recovery speed	Depend on I/O speed of underneath Blob storage, Backup Vault, Disk and VM CPU and networking performance				Fast	I/O speed of underneath Blob

# SAP-Certified 3rd party backup solutions



IBM  
**Spectrum**  
Protect

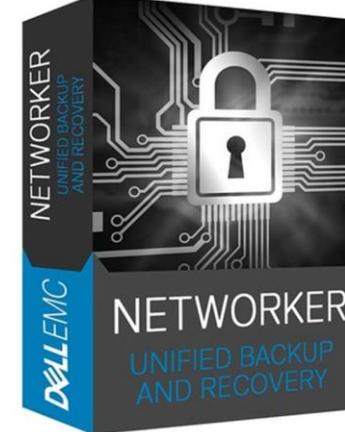


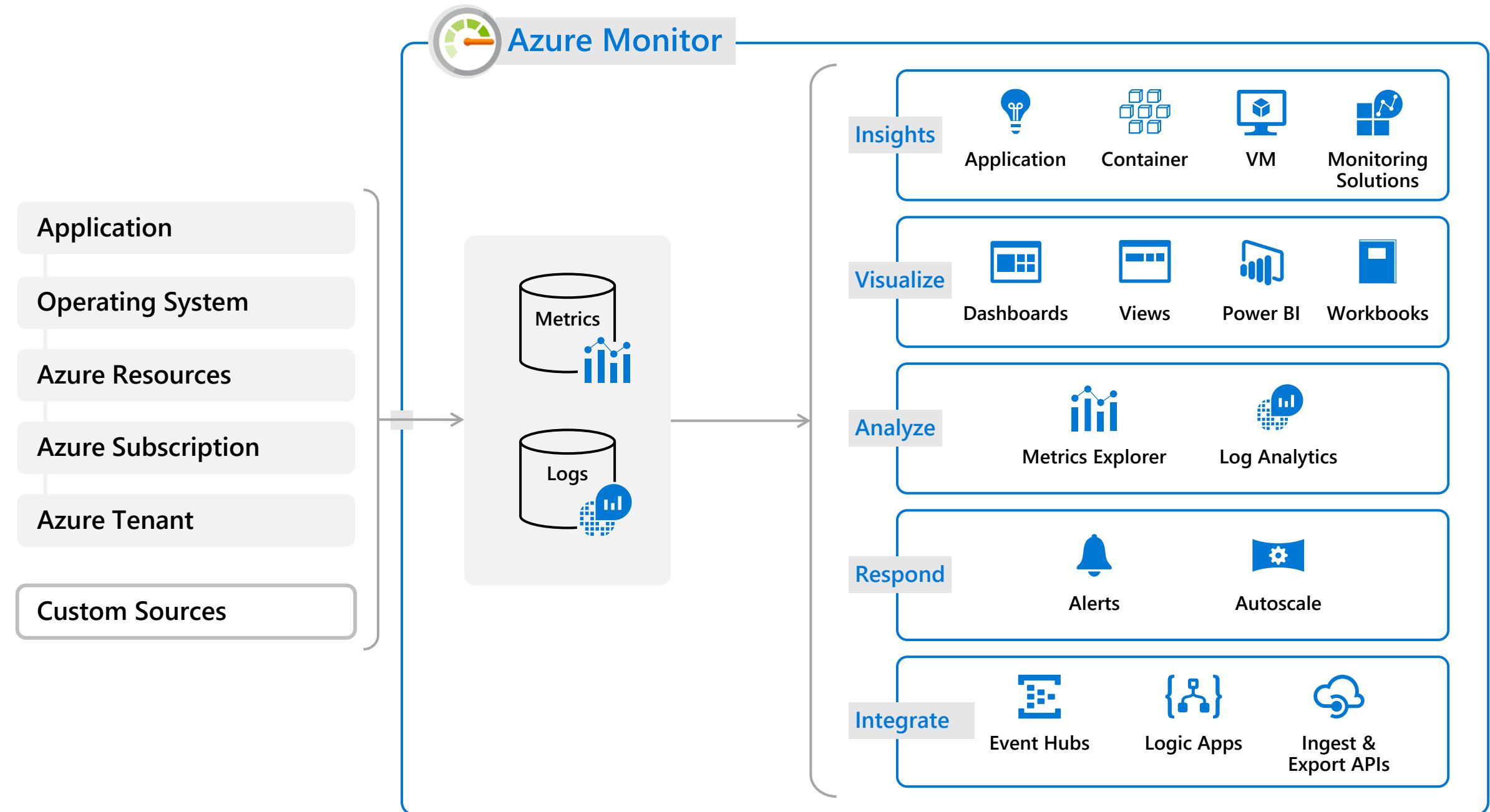
**VERITAS**<sup>TM</sup>



**Data Protector**

**veeAM**





# Azure Monitor for SAP Solutions (preview)

## New! Azure Monitor for SAP Solutions

- Applicable for customers running their workloads on Azure Virtual Machine and Azure Large Instance.
- Does not run an agent on customer's HANA server.
- Scalable query framework
- Integration with Azure KeyVault

## Visualization in Azure Portal

- Infrastructure utilization, anomalies and forecasts
- HA cluster metrics is in roadmap!

## Available in Private Preview!

- Integration with Azure Marketplace



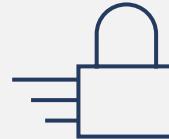
# Improving security across hybrid cloud environments



Strengthen security posture



Protect against threats



Get secure faster

# What is Governance ?

A collection of concepts and services that are designed to enable management of your various Azure resources at scale

Azure subscriptions will get very messy very quickly without proper governance and boundaries

Accounts

Subscriptions

Role-Based  
Access Control

Resource Groups  
Resource Tags  
Resource Locks

Policies

Auditing and  
monitoring

Tooling is there, but by default it has little value unless properly understood and employed

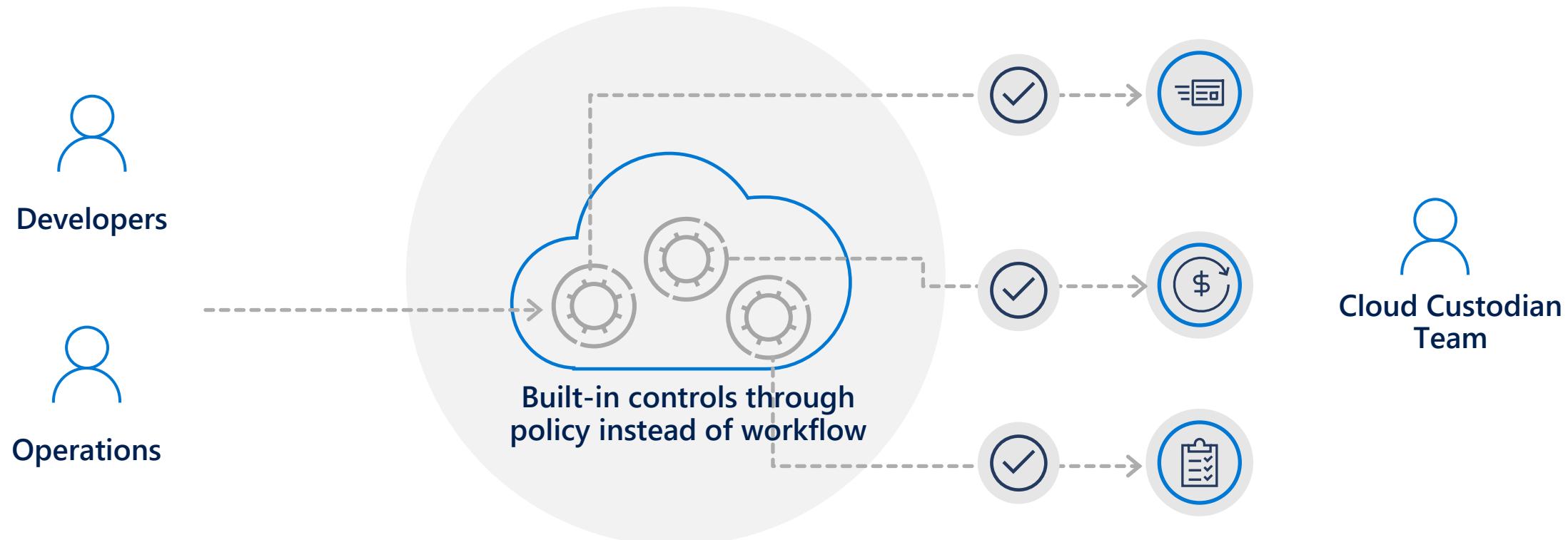
# Traditional approach

Sacrifice Speed for Control



# Cloud-native governance

**Speed and Control**



# Governance for the cloud

Native platform capabilities to ensure compliant use of cloud resources



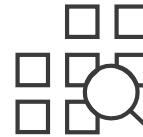
## Policy

Real-time enforcement, compliance assessment and remediation



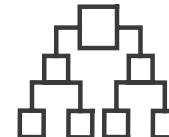
## Blueprints

Deploy and update cloud environments in a repeatable manner using composable artifacts



## Resource Graph

Query, explore & analyze cloud resources at scale



## Management Group

Define organizational hierarchy



## Cost

Monitor cloud spend and optimize resources

## Control

## Environment

## Visibility

## Hierarchy

## Consumption

# Overview: Identity services

Azure facilitates authentication and authorization scenarios for IaaS deployments using the following services:

- **Active Directory Domain Services (AD DS)**
- **Azure Active Directory (Azure AD)**
- **Azure Active Directory Domain Services (Azure AD DS)**

# Azure Bastion

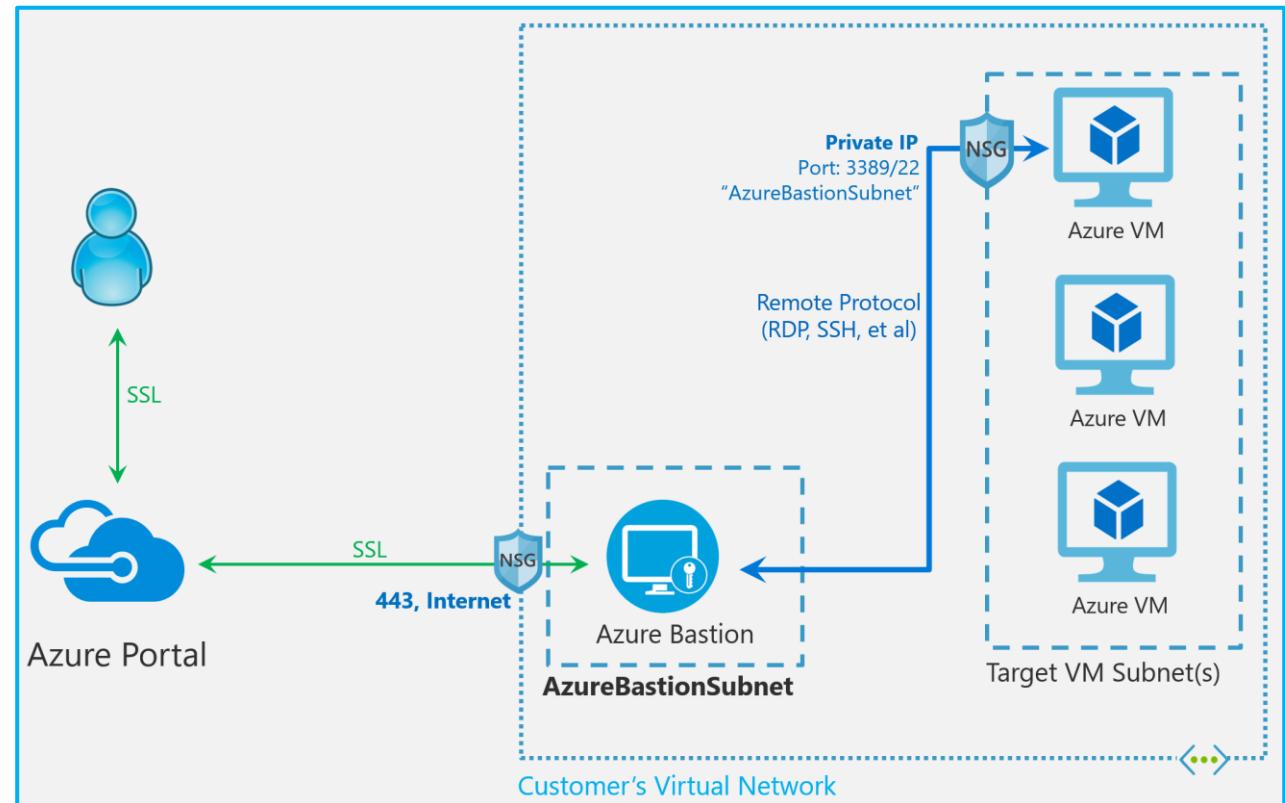
GA  
Released @ Ignite  
November 2019

## Managed RDP/SSH to VMs over SSL using private IP on the VM

- Connect your RDP and SSH sessions directly in the Azure Portal using a single click experience
- Log into your Azure virtual machines and avoid public Internet exposure using SSH and RDP with private IP addresses only
- Integrate and traverse existing firewalls and security perimeter using a modern HTML5 based web client and standard SSL ports
- Use your SSH keys for authentication when logging into your Azure virtual machines

## Value-Prop:

- **Limit public exposure of virtual machine IPs** - Access all virtual machines within a virtual network through a single hardened access point. Exposing the bastion host as primary exposed public access helps lockdown of public Internet exposure and limit threats such as port scanning and other types of malware targeting your VMs.
- **Fully managed bastion service** - Take advantage of a fully managed, autoscaling and hardened PaaS service, to provide you secure RDP and SSH connectivity.
- **RDP and SSH to Azure Virtual Machines over SSL** - connect to your virtual machines in your virtual network over SSL, port 443, directly in Azure Portal. This enables clientless RDP/SSH connectivity so that you can connect from anywhere – any device and any platform, and without any additional agent running inside your virtual machines.



## Post-GA features in roadmap:

- Azure Active Directory Integration with M/2FA and SSH Key Management
- Native client support
- Peered virtual network support
- Full session video recording, monitoring and audit

[Public Preview released June CY18](#)

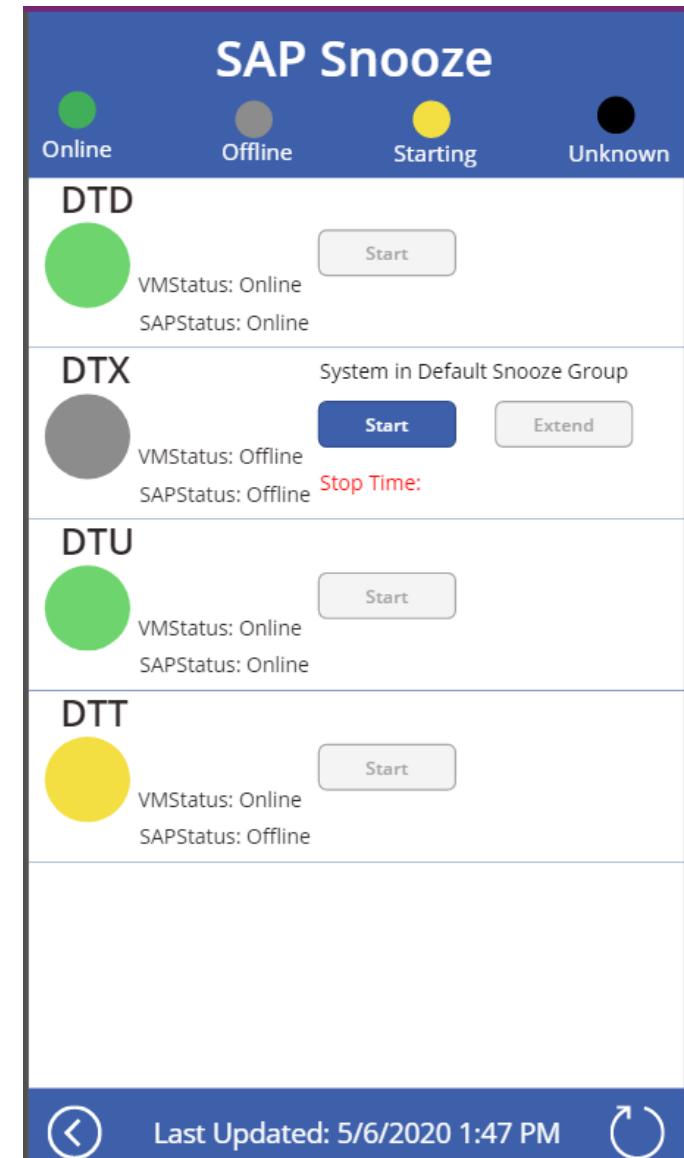
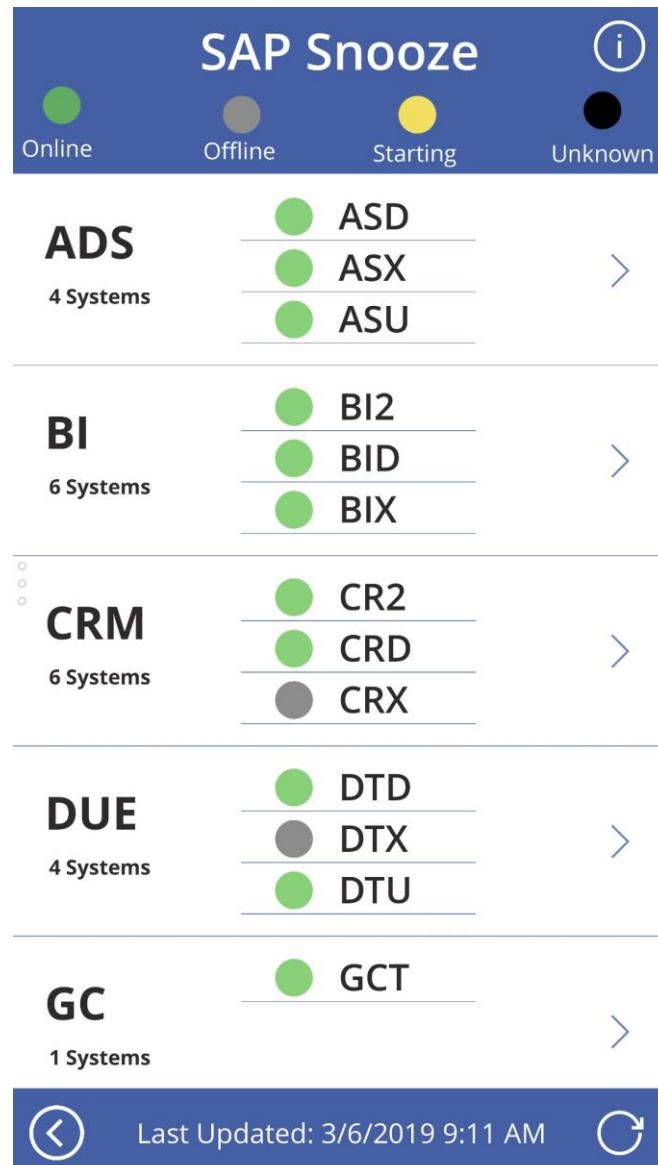
# SAP Snooze Via PowerApps

Simple PowerApps front-end to PowerShell scripts

Allows self-service snoozing and un-snoozing for authorized SAP Developers and Basis Team Members

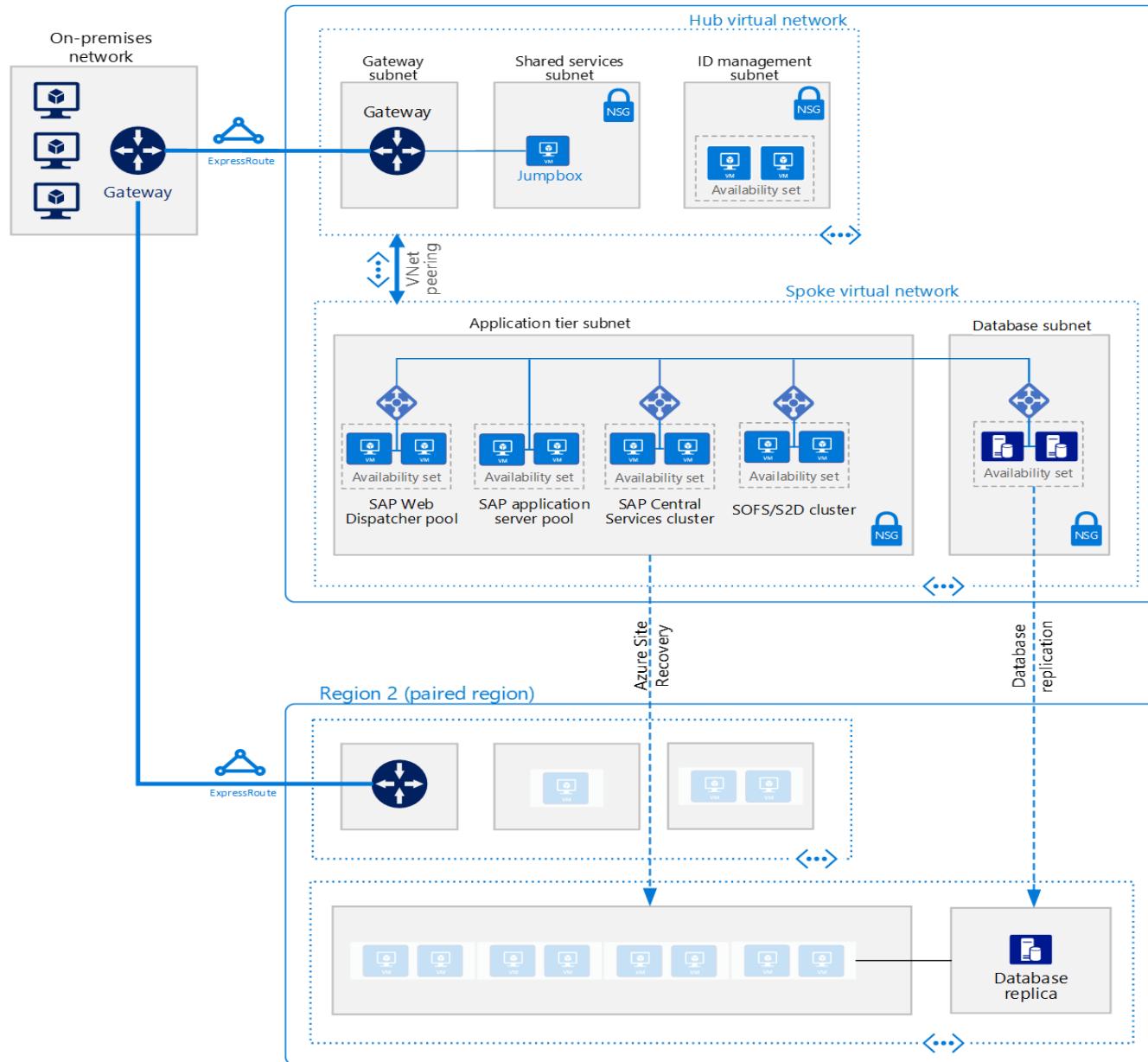
Quick check of current snooze status

<https://github.com/microsoft/SAPAzureSnooze>



# Utilize Azure for SAP workload reference architecture

# Deploy SAP NetWeaver (Windows) for AnyDB on Azure virtual machines



Azure VMs are on-demand and SAP NetWeaver certified for SQL Server, Oracle, IBM DB2, SAP ASE

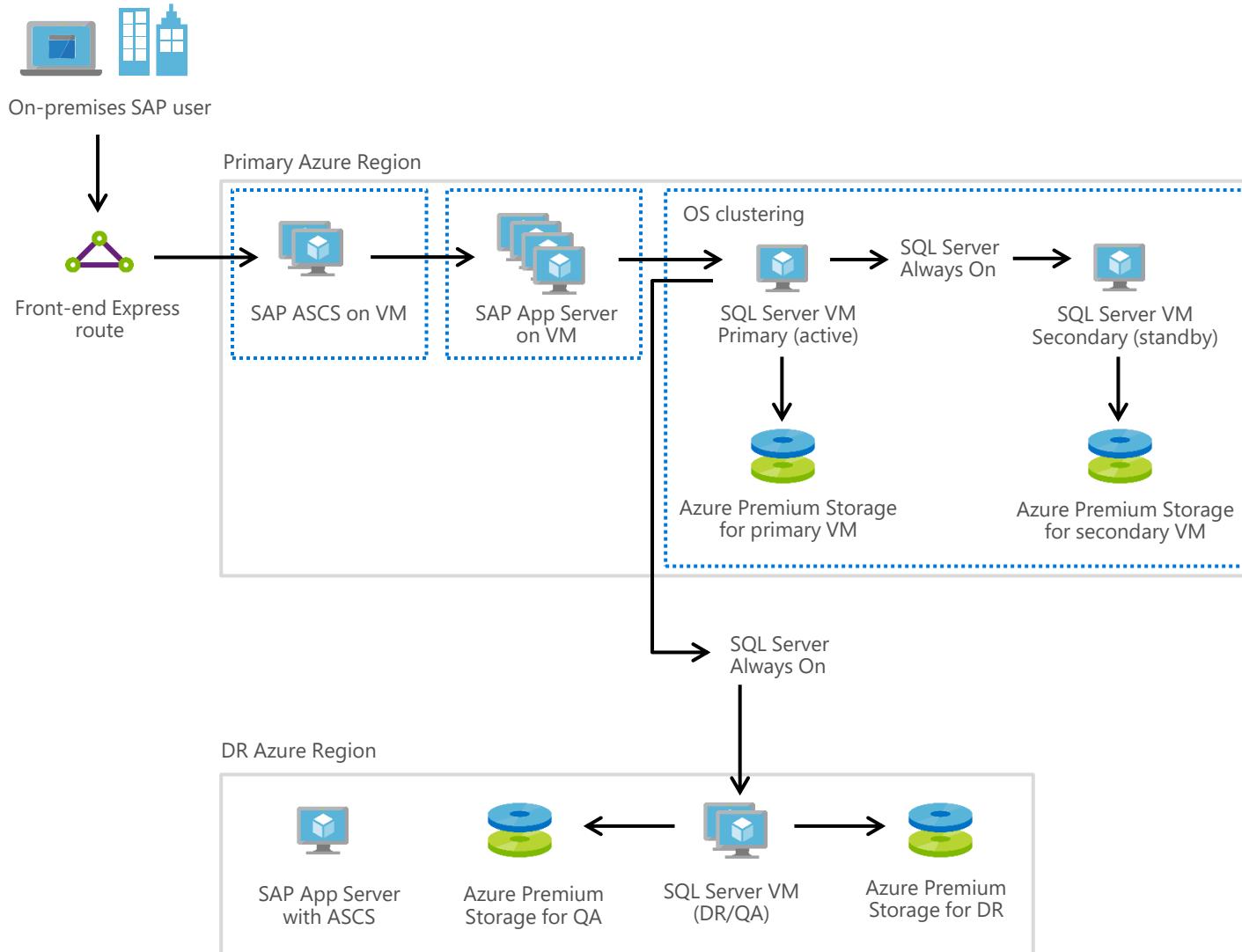
Azure VMs offer up to 99.99% availability

Azure Premium Storage offers high performance

Azure region pairs and DB replication such as SQLServer AlwaysOn offers cost effective Disaster Recovery

ExpressRoute offers high speed secure connectivity to your users on-premises

# SAP ERP with AnyDB on Azure architecture



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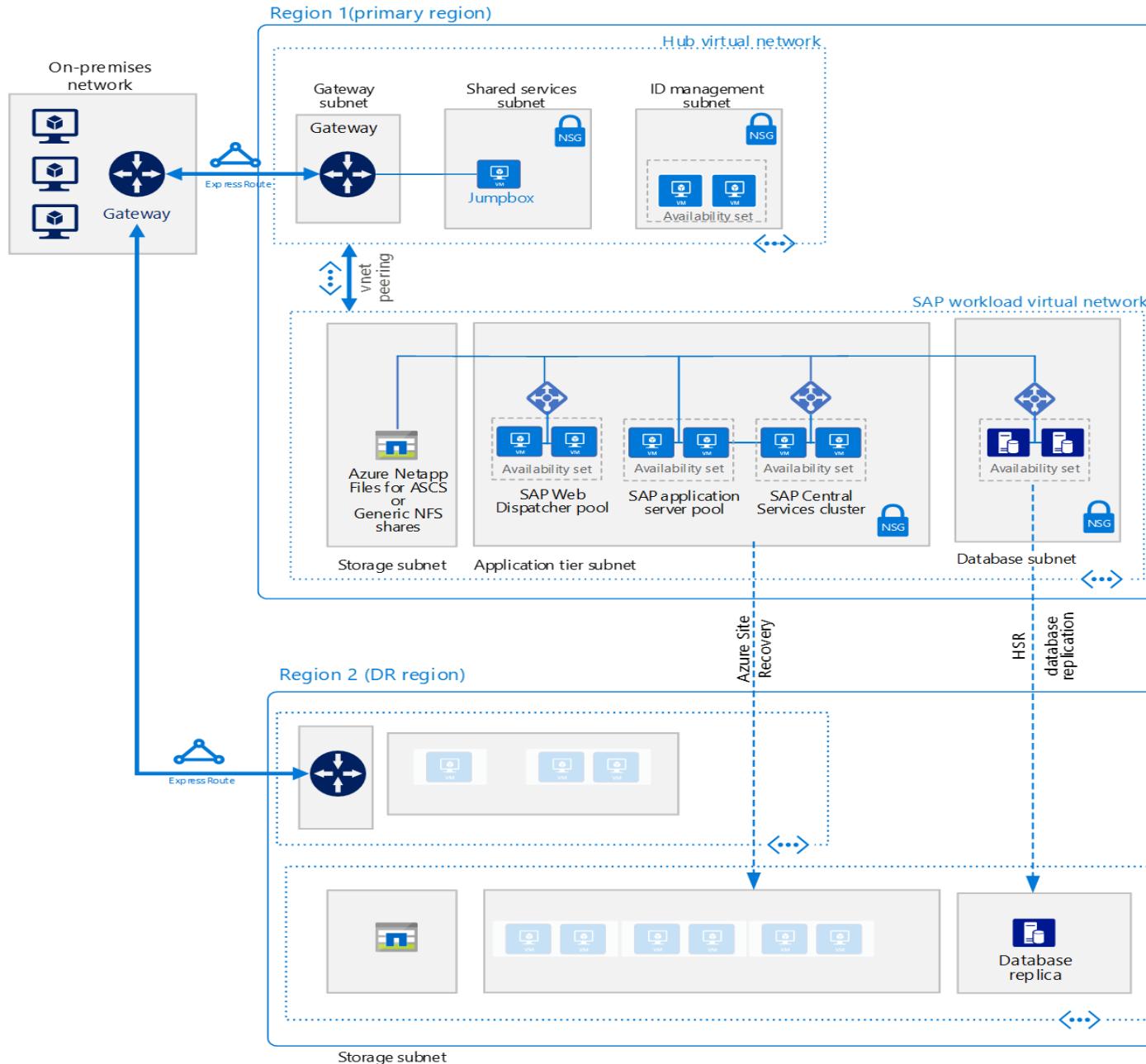
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# SAP S/4HANA for Linux virtual machines on Azure



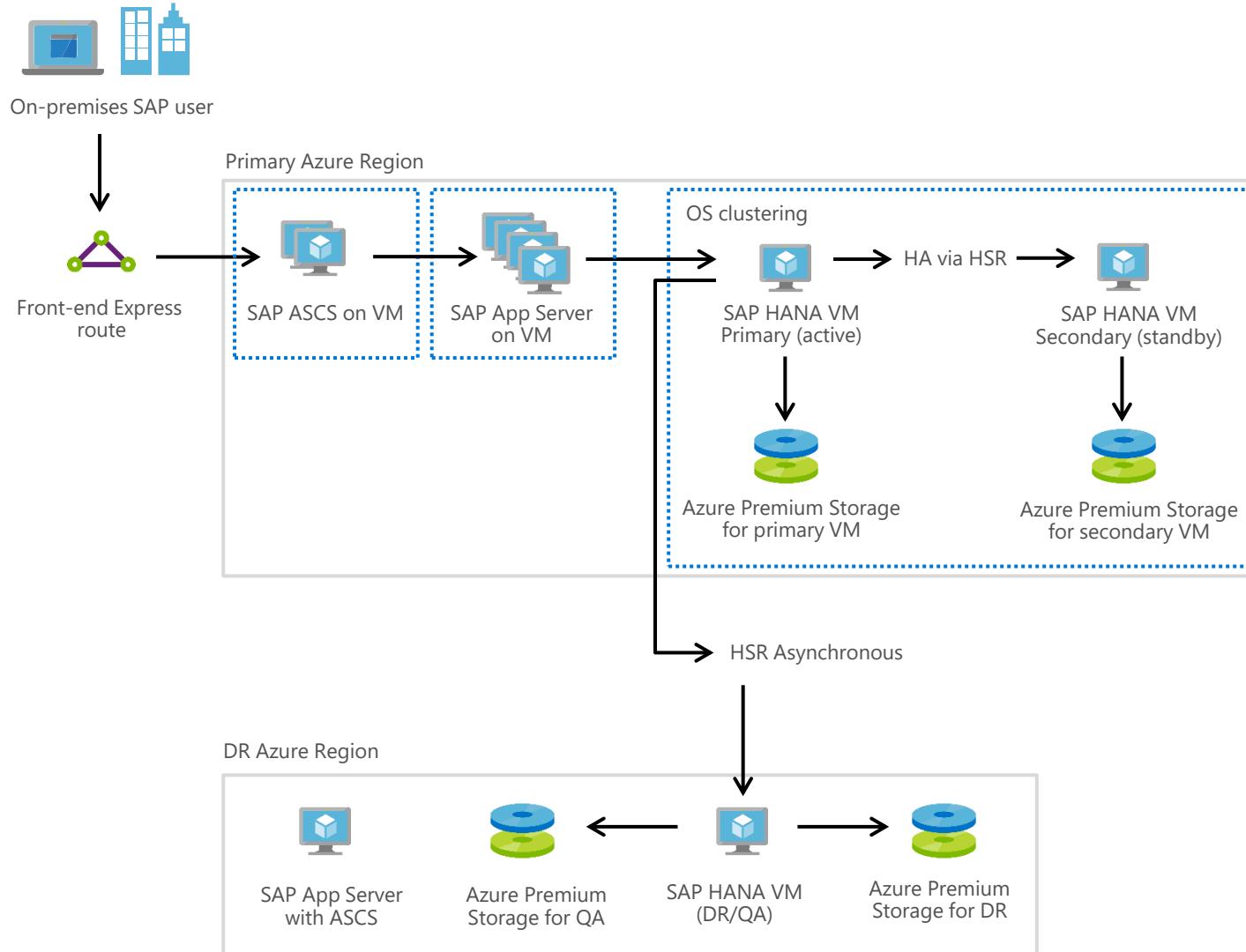
HANA on M-series VMs can be made highly available with OS clustering such as Fencing and Stonith on SUSE or RedHat

App Server VMs are made highly available with Azure VM availability set

M-series VMs offer Write Accelerator for high performance

HANA System Replication (asynchronous) enables DR configurations

# SAP HANA on Azure VM Architecture



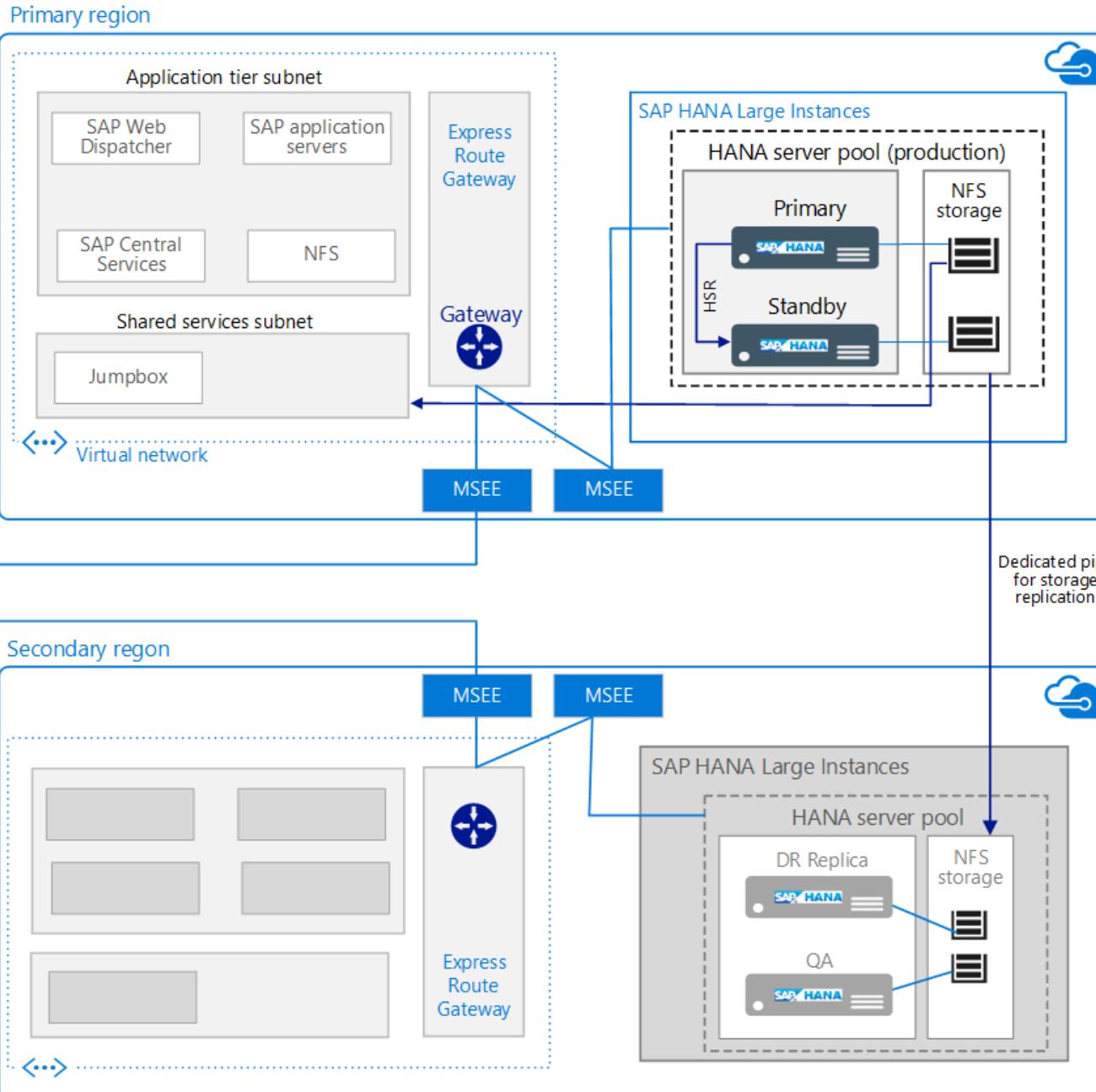
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HANA System Replication (asynchronous) enables DR configurations

# Run SAP HANA on Azure Large Instances



HANA on HLIs can be made highly available with OS clustering such as Fencing and Stonith on SUSE and data replication via HSR

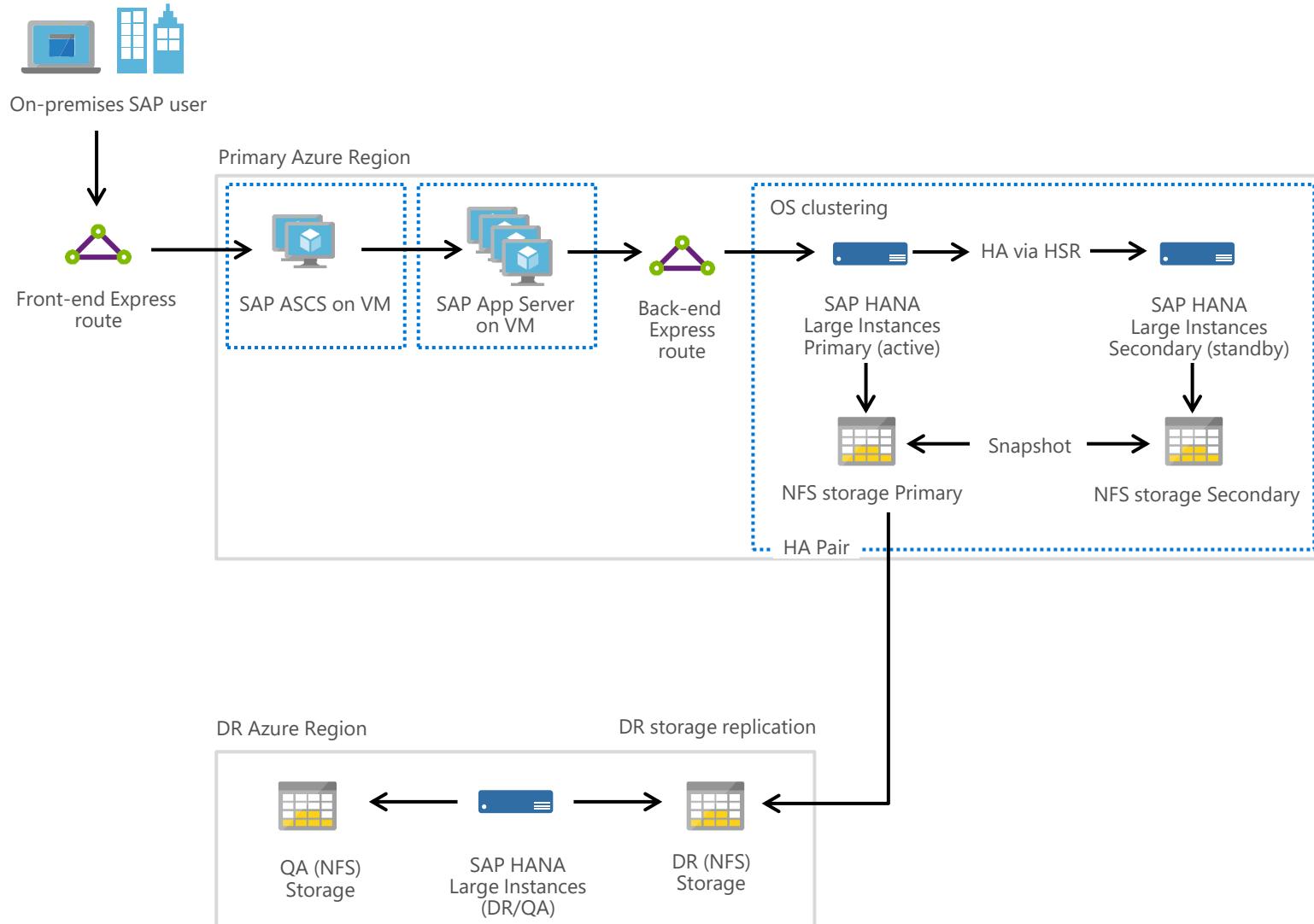
App Server VMs are made highly available with Azure VM availability set

HANA Large instances offer high performance NFS storage with <1ms write latency

HLIs are connected with a 40GB network

Storage snapshot replication offers built-in disaster recovery

# SAP HANA on Azure HANA Large Instance Architecture



HANA on HLIs can be made highly available with OS clustering such as Fencing and Stonith on SUSE and data replication via HSR

App Server VMs are made highly available with Azure VM availability set

HANA Large instances offer high performance NFS storage with <1ms write latency

HLIs are connected with a 40GB network

Storage snapshot replication offers built-in disaster recovery

# SAP on Azure Characteristics

- 
- 1 Agility to Scale
  - 2 In-memory Database Performance
  - 3 High Availability & Disaster Recovery
  - 4 Enterprise Data Protection & Security
  - 5 Safe and Easy Migration
  - 6 IT standardization between SAP and Non-SAP

# Baseline Knowledge for SAP as a Service on Azure

Icon	Name	Description
	Region	An area within a geo that does not cross national borders and contains one or more datacenters.
	Subscription	A customer's agreement with Microsoft that enables them to obtain Azure services.
	Azure Active Directory (Tenant)	Azure Active Directory helps you manage user identities and create intelligence-driven access policies to secure your resources.
	ExpressRoute	Direct Connectivity from customer network to Microsoft Enterprise Edge (MSEE)
	MSEE (Enterprise Edge)	Each ExpressRoute circuit consists of two connections to two Microsoft Enterprise edge routers (MSEEs) from the connectivity provider/your network edge.
	Virtual Network	A network that provides connectivity between your Azure resources that is isolated from all other Azure tenants.
	Subnet	A subnetwork or subnet is a logical subdivision of an IP network.
	Network Security Group	NSG contains a list of security rules that allow or deny network traffic to resources connected to Azure Virtual Networks (VNet)
	VPN Gateway	A specific type of virtual network gateway that is used to send encrypted traffic between an Azure virtual network and an on-premises location over internet.
	ExpressRoute Gateway	A specific type of virtual network gateway that is used to send traffic between an Azure virtual network and an on-premises location over ExpressRoute/Direct Peering.
	Virtual Machines	The software implementation of a physical computer that runs an operating system.
	Azure Premium Storage and Managed Disks	Azure Storage offers a massively scalable object store for data objects, a file system service for the cloud
	Availability Set	A collection of virtual machines that are managed together to provide application redundancy and reliability.
	Internal Load Balancer	ILB directs traffic only to resources that are inside a virtual network or that use a VPN to access Azure infrastructure. (Layer 4)
	HANA on Azure Large Instances	HANA tailored data center integration (TDI) certified server hardware infrastructure
	NFS Storage	HANA tailored data center integration (TDI) certified storage infrastructure
	High Availability Pair	two or more identical HANA large instances deployed in the same region and configured by the customer for system replication
	Backend ExpressRoute	Backend network to connect Azure Virtual Network and HANA Large Instances stamp
	Azure Backbone Network	Microsoft owned global fiber network linking all Azure datacenters
	Regional Pairs	Regional protection within data residency boundaries

# Azure VM Design Tips

1

Use certified VM types

2

Use Premium Storage for database

3

Make sure to have additional storage for backup

4

Set up HA + DR as needed

5

Guide customer to use ExpressRoute



# HANA on Azure Large Instances Design Tips

1 Know customer's sizing requirements and propose certified solutions

2 Know customer's HA/DR requirements and propose appropriate solutions

3 Don't forget Jump box, Patching Server, IP Forwarding, Backup and Monitoring

4 Get customer's provisioning timeline and share forecast with Microsoft Ops Team

5 Design network for frontend ExpressRoute, Azure VNET(s)/subnet(s) and HANA Large Instances

6 Be clear on customer's responsibilities after provisioning

# Planning for implementing SAP solutions on Azure

# Azure VM compute considerations for SAP workloads

- The SAP Application Performance Standard (SAPS) metric
  - One of the major criteria for determining whether a VM size offers throughput requirement necessary for a given SAP workload.
- Consider whether you will implement it by using the 2-tier or 3-tier architecture.
- VM types have certain bandwidth limitations.
  - In general, the smaller the VM has the smaller the storage and network bandwidth.
- To maximize performance, recommends applying additional factors and considerations after conducting an SAP sizing analysis.

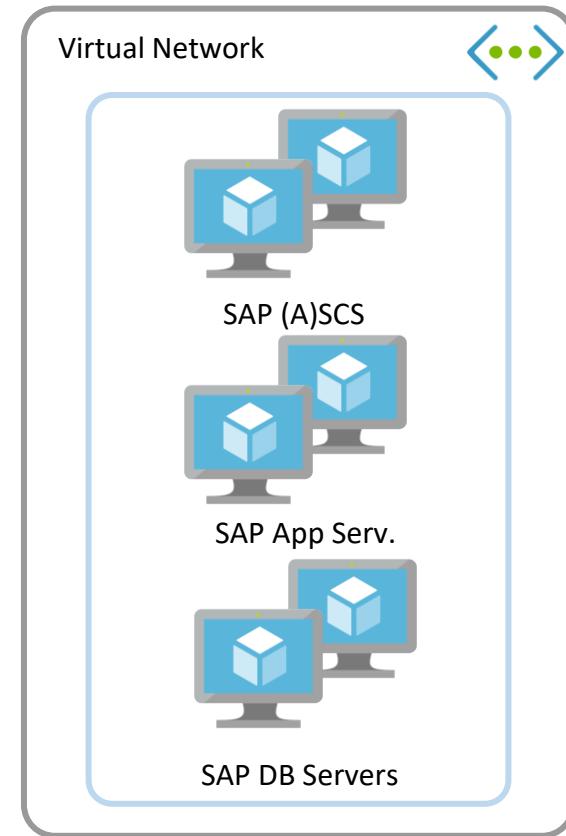
# Multi-tier architecture for SAP workloads

## 3-tier (\*)

- Presentation tier (SAP GUI, Fiori UX, Web Dynpro)
- Application tier
  - SAP (A)SCS – SAP Central Services instance
  - ABAP/Java stack
  - Application servers – Primary (PAS) and Additional (AAS) instances
- Database tier
  - DBMS (HANA, SQL Server, Oracle, SAP ASE, IBM DB2, MaxDB)

## 2-tier

- Presentation tier (SAP GUI, Fiori UX, Web Dynpro)
- Application + Database tier – (A)SCS, PAS, AAS, DBMS



Azure SAP deployment

(\*) 3-tier architecture is required for SAP High Availability

# Approaches to sizing SAP systems

- Reference sizing (existing sys.)
  - Reference on-premises configuration (ST06)
  - Early Watch Report
- SAP Quick Sizer (new systems)
  - <https://service.sap.com/quicksizer>
- T-Shirt (new systems)

The screenshot shows the SAP Quick Sizer interface. On the left, a 'Create project' dialog is open for 'ECC1' with fields for Customer no. (31910) and Project Name (ECC1). Below it is an 'Input Navigation Tree' showing the SAP Business Suite hierarchy, including Financials, Biller Direct, and Human Capital Mgmt. On the right, there are two tables for throughput analysis:

**Table 1: Throughput - Standard Background Sizing - CPU**

Element	Element short text	A/P	TI
CIT-RERA	Chargeable Items ReRating	P	P
BIT-BILL	BIT Billing	P	P
LOAD-BILL	Load Billing	P	P
LOAD-INV	Load Invoicing	P	P
CONV-INV	Convergent Invoicing	P	P
DUNNING	Dunning	P	P

**Table 2: Throughput - Standard Background Sizing Without Items - CPU**

Element	Element short text	A/P	TI
CIT-UPL	Chargeable Items Upload	P	P
CIT-RATE	Chargeable Item Rating	P	P
BIT-UPL	BIT Upload	P	P
PAY-RUN	Payment Run	P	P
CD-PL	Payment Lots	P	P
CORR-PRINT	Correspondence Print	P	P
DEF-POST	Deferred Postings	P	P

SAP Quick Sizer

# Sizing Example - S/4HANA on VM

- 1 Choose VM type for SAP ASCS (\*) , Application (based on SAPS) & HANA Database (based on MEM)
- 2 Determine Premium Storage type and # of disks for SAP HANA DB Files, based on requirements (TDI/HWCCT)
- 3 Set up high availability solution for SAP ASCS and SAP HANA Database, based on SLA

(\*) ASCS : ABAP SAP Central Services – part of SAP application servers running message/enqueue service, which is a single point of failure (SPoF)

## Requirements

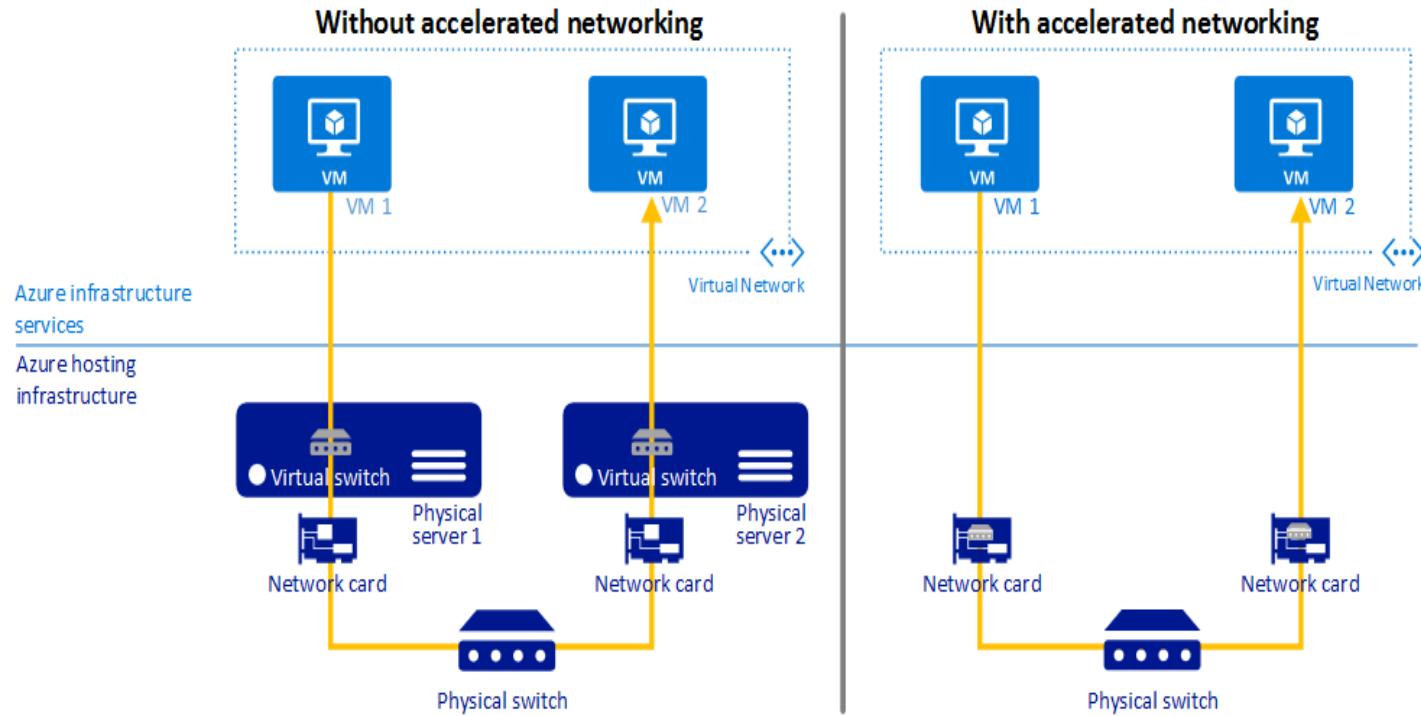
## Sizing for Azure

	SAPS needed	Memory Needed	DB Storage	Azure VM Type	# of VMs	All Active ?	SAPS provided	Database File Disk Choice/Layout	Throughput DB Files	Storage size allocation for DB Files	Database Log Disk Choice/Layout	Latency for Log
ASCS (*)	17,000	-		D2_v3	2	Active/Passive	2,189	-				
Application		-		D8_v3	2	All Active	17,420	-				2
Database	-	4 TB	TDI Best Practice	M128ms	2	Active/Passive	134,630	5 x P30 disks (1TB, 5000 IOPS/ disk)	1 GBps	5TB	2 x P20 disk (0.5TB, 300 MB/s Throughput )	< 1ms

# Azure VM networking considerations for SAP workloads

- The virtual networks the SAP application is deployed into don't have access to the internet.
- The database VMs run in the same virtual network as the application layer.
- The VMs within the virtual network have a static allocation of the private IP address.
- To separate and isolate traffic to the DBMS VM, assign different NICs to the VM.
- Divide virtual network address space into subnets.
- The communication path between the SAP application layer and the DBMS layer must be a direct one.
- Azure VMs can benefit from Accelerated Networking and Proximity Placement Groups.

# Accelerated Networking for SAP workloads



- Accelerated Networking must be enabled when a VM is created.
- SQL Server running with datafiles stored directly on blob storage are likely to greatly benefit.
- It is possible to have one or more Accelerated Network NICs and a traditional non-accelerated network card on the same VM.
- SAP application server to database server latency can be tested with ABAP report /SSA/CAT -> ABAPMeter
- Inefficient “chatty” ABAP code or particularly intensive operations such as large Payroll jobs or IS-Utilities Billing jobs have shown significant improvement.
- Make sure to use Standard Azure Load Balancer (rather than Basic)

# Azure VM storage considerations for SAP workloads

- Refer to recommendations when configuring the paging/swap file
- The use of managed disks is recommended for all SAP workloads.
- Recommends using Azure Premium SSD Storage for most workloads
  - except of SAP application workload and non-performance sensitive DBMS
- Using Multi-disk volume with stripe for /hana/data and /hana/logs
- Caching
  - Read caching for disks hosting SAP database data files
  - No caching for the disks containing SAP database log files
  - For SAP HANA
    - /hana/data - no caching
    - /hana/log - no caching (with exception for M-Series VMs)
    - /hana/shared - read caching
- Capabilities of Ultra SSD are not bound to the disk size.

# Azure VM high availability and disaster recovery for SAP workloads

- High availability of SAP workloads on Azure VMs can be analyzed in two different contexts:

## HA of SAP workloads

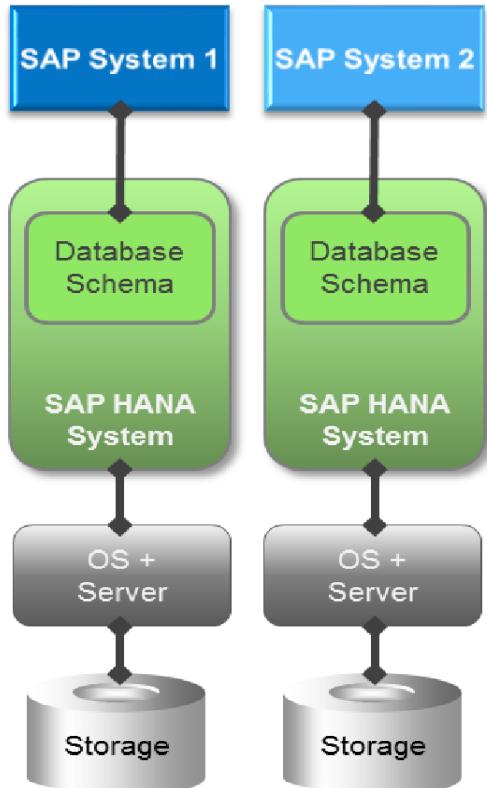
- SAP application servers
- SAP ASCS/SCS instance
- DBMS server

## HA capabilities of Azure infrastructure

- Azure VM restart
- High availability of compute (VMs), network, and storage, based on:
  - Availability Sets
  - Availability Zones

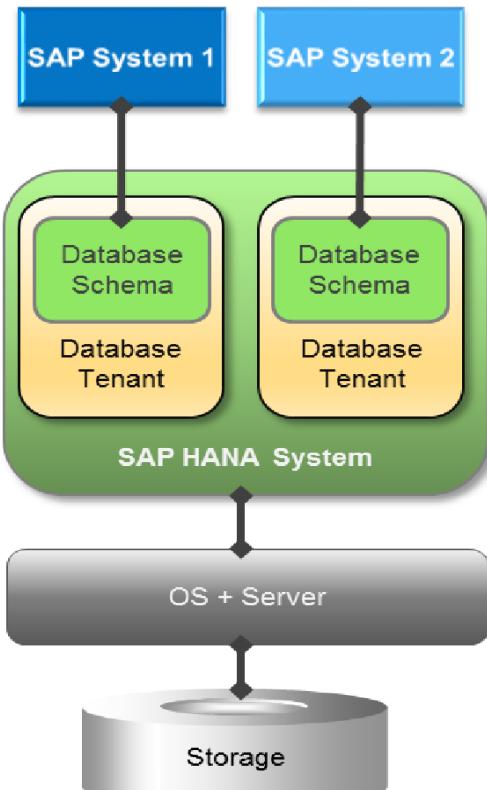
# SAP workload Deployment Scenarios

**Standard/SCOS**



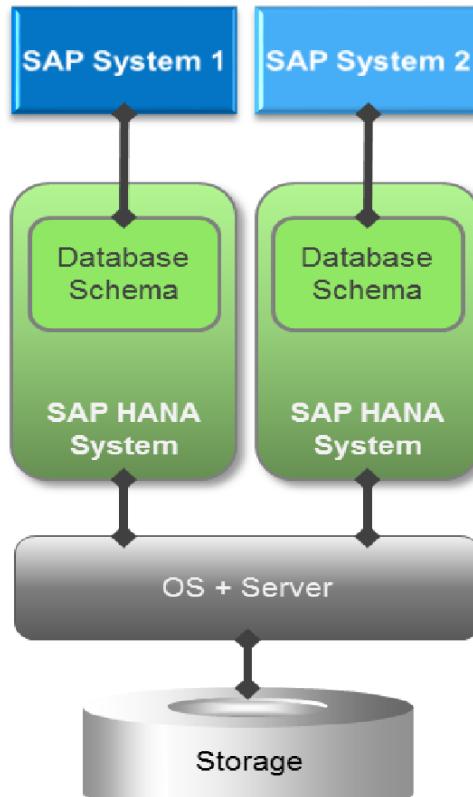
Single-SID deployment  
with two clusters

**MDC**



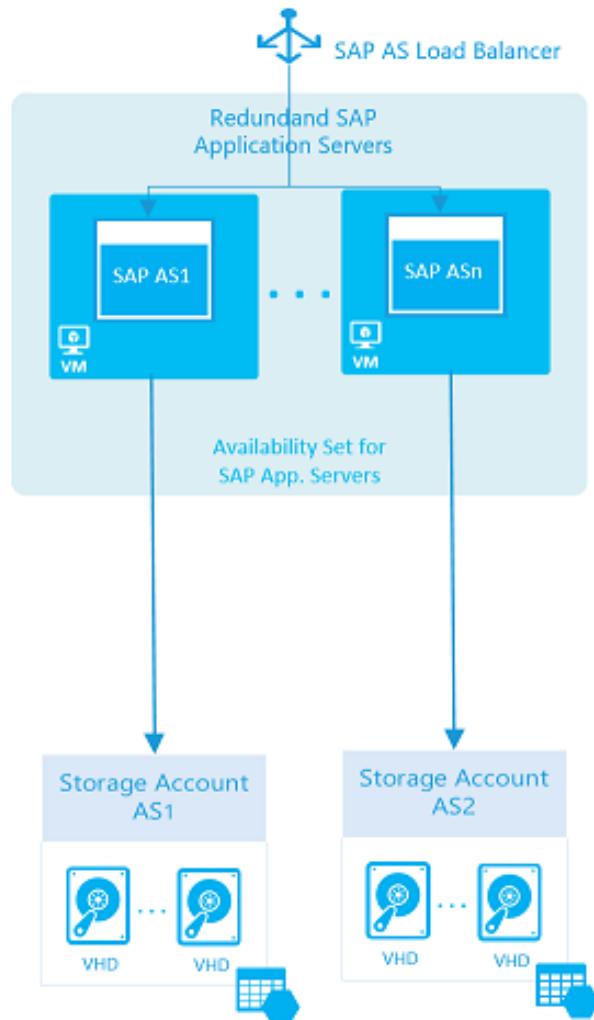
Single-SID deployment with a  
single cluster

**MCOS**



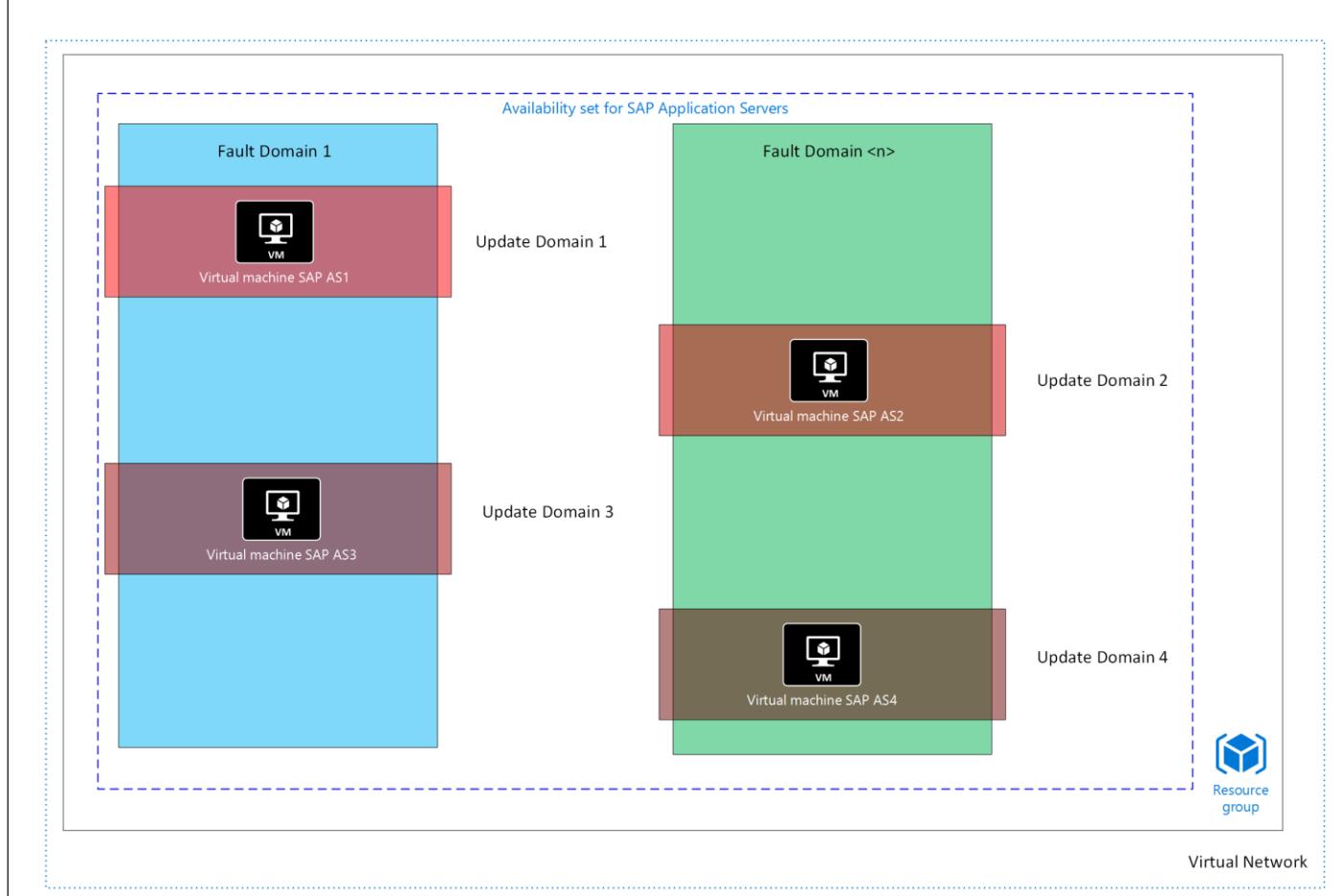
Multi-SID deployment

# High availability of SAP application servers



- Achieve high availability by redundancy for SAP Application servers.
- Install individual application servers on separate Azure VMs.
- Should have at least two SAP application instances installed in two instances of Azure VMs.
- Should place all virtual machines that host SAP Application Server instances in the same Azure availability set.

# High availability of SAP application servers (cont.)

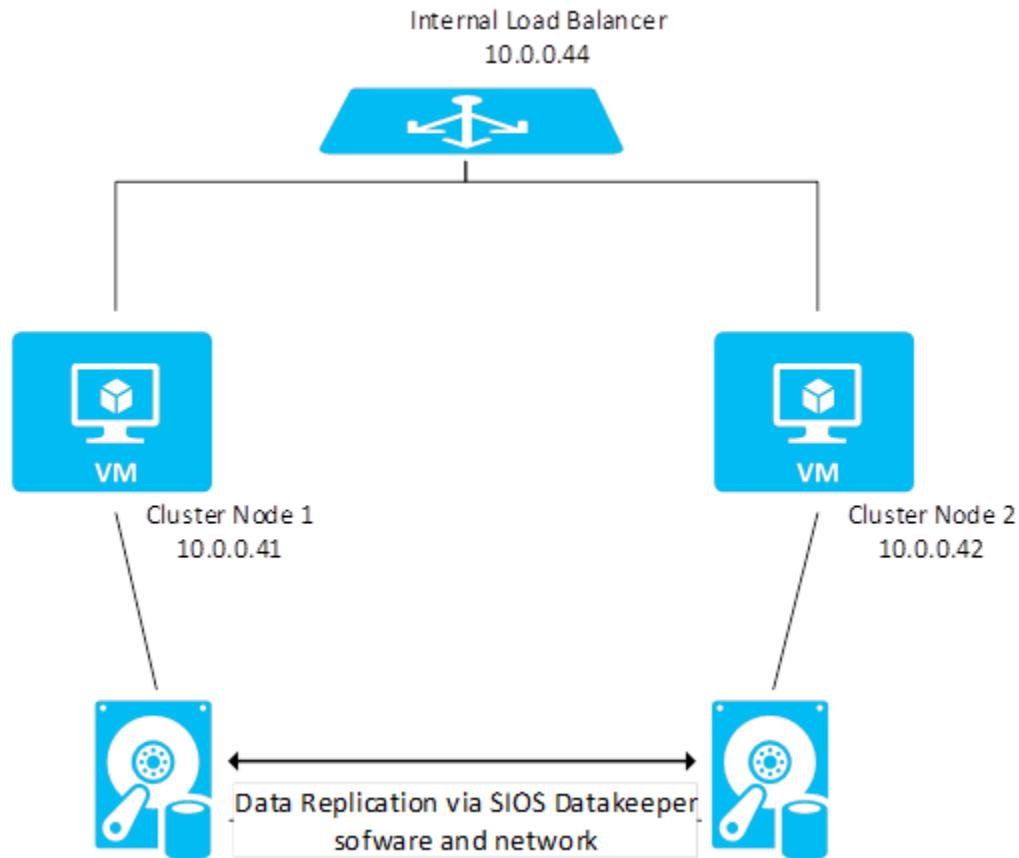


- Each Azure VM belongs to a different upgrade domain
- Each Azure VM belongs to a different fault domain

# High availability of SAP ASCS/SCS instances

- Azure VMs require additional provisions to implement operating system-dependent clustering capabilities.
- Cases of High availability for SAP ASCS/SCS instances
  - High-availability architecture for an SAP ASCS/SCS instance on Windows (single-SID configuration)
  - High-availability architecture for an SAP ASCS/SCS instance on Linux (single-SID configuration)
  - High-availability architecture for an SAP ASCS/SCS instance on Windows (multi-SID configuration)

# HA architecture for an SAP ASCS/SCS instance on Windows (single-SID configuration)



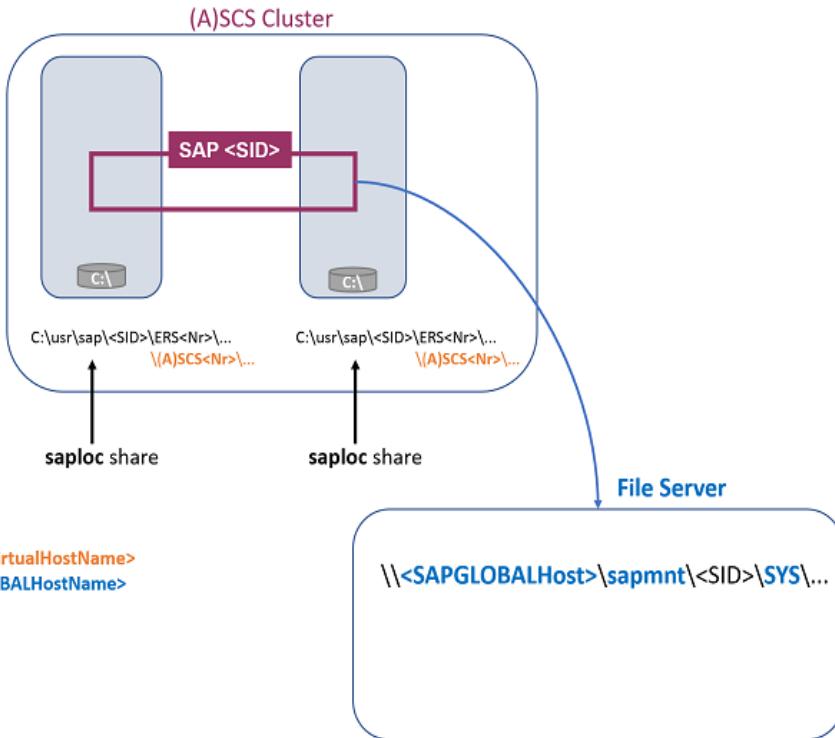
- Use a Windows Server Failover Clustering (WSFC) solution to protect the SAP ASCS/SCS instance.
- Cluster the SAP ASCS/SCS instance by using clustered shared disks.
- Such disks can be implemented by using third-party solutions, such as SIOS DataKeeper.

# HA architecture for an SAP ASCS/SCS instance on Windows (single-SID configuration)

## Legend:



Local Disk:

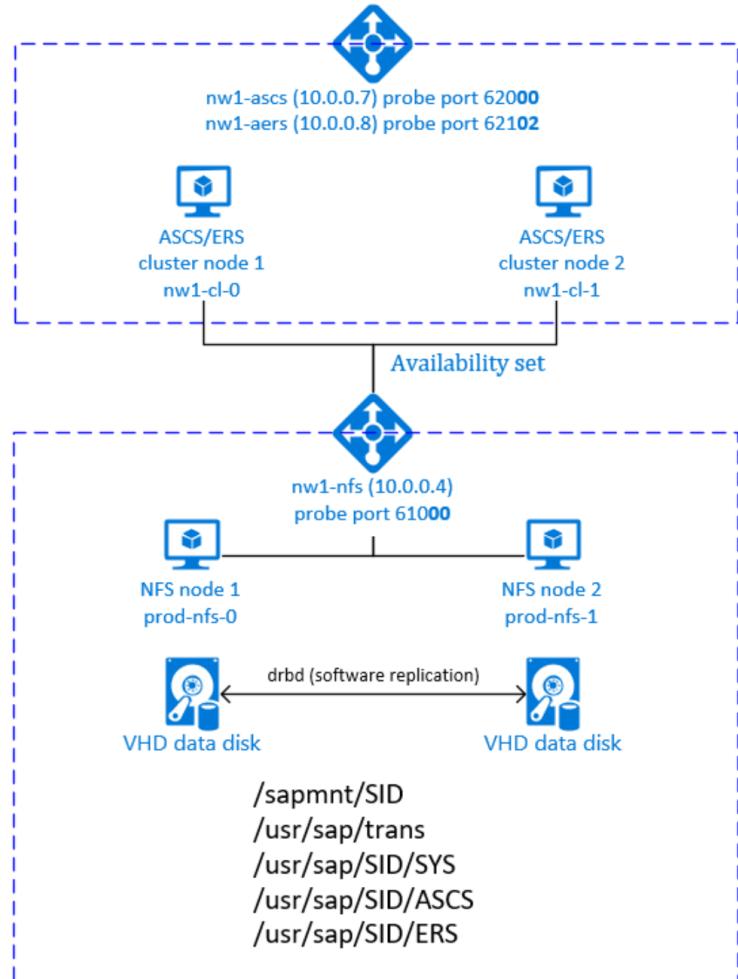


- Cluster the SAP ASCS/SCS instance by using file share.
- Access the /sapmnt global directories via a UNC path.
- A highly available UNC /sapmnt share can be implemented by using Windows Server Failover Cluster with Scale Out File Server (SOFS) and the Storage Spaces Direct (S2D) feature in Windows Server 2016.

# HA architecture for an SAP ASCS/SCS instance on Linux (single-SID configuration)

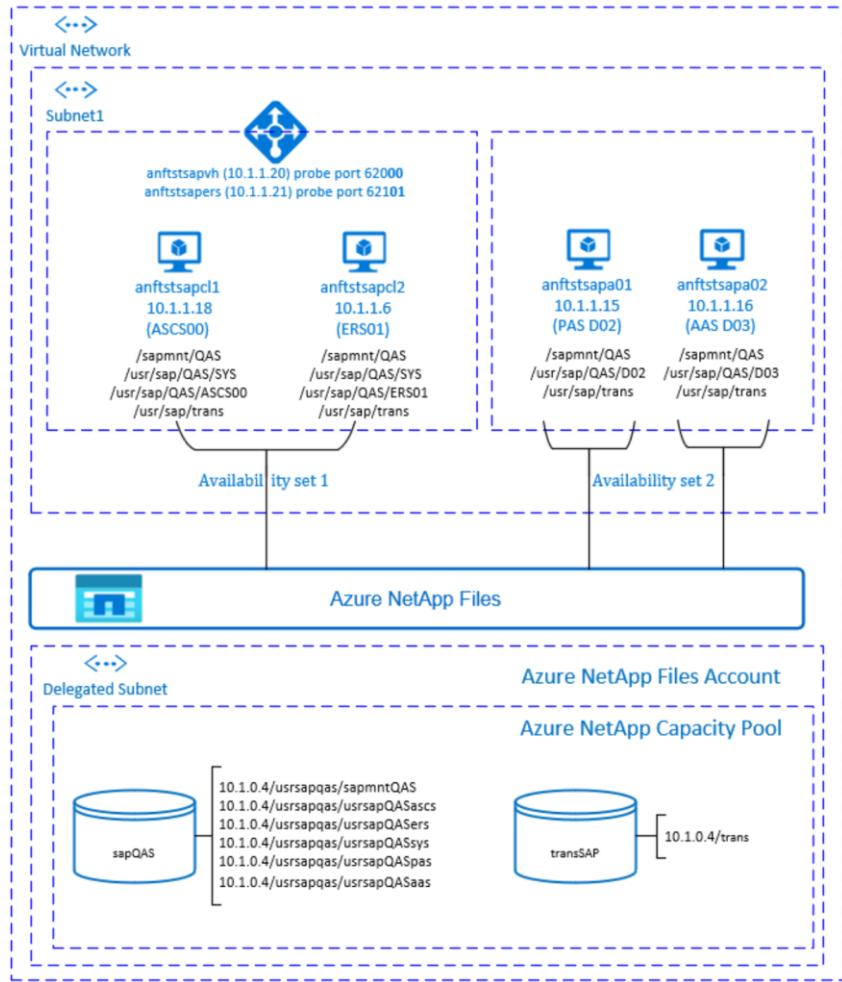
- Require the use of Linux clustering, Pacemaker with STONITH
- Require a highly available NFS share, which can be provisioned by
  - Using Azure VMs in a separate cluster
  - Azure NetApp Files
  - Red Hat GlusterFS

# HA for SAP NetWeaver on Azure VMs on SLES for SAP applications



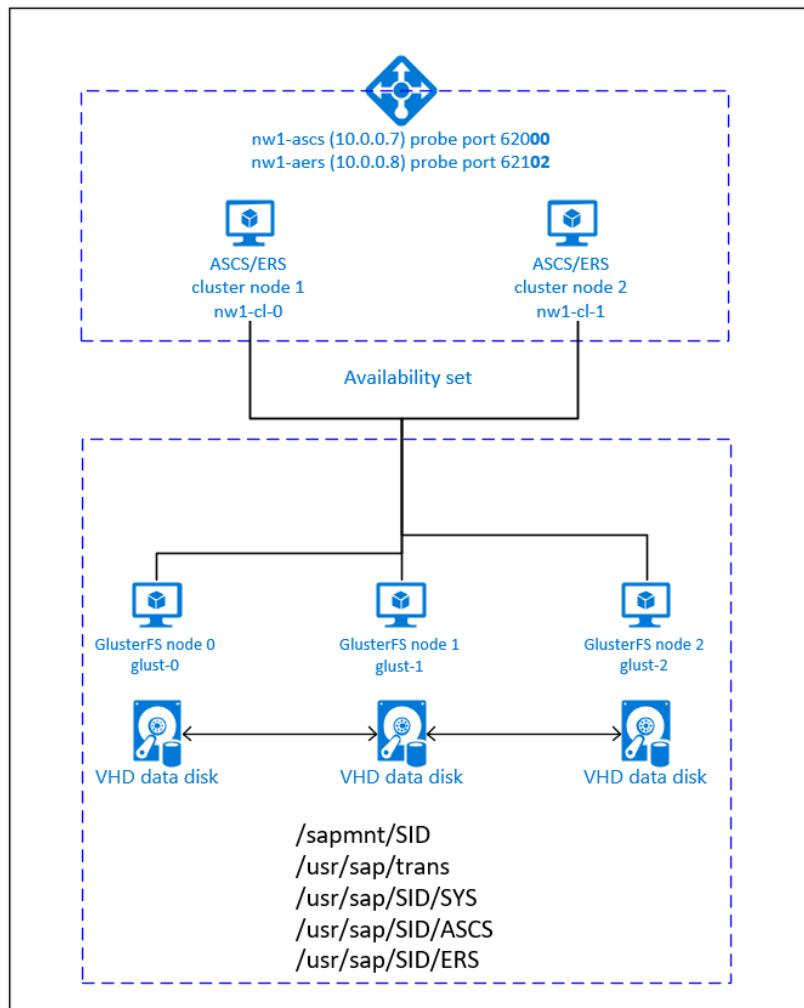
- SAP NetWeaver requires an NFS server.
- The NFS server is configured in a separate cluster and can be used by multiple SAP systems.
- The NFS server, SAP NetWeaver ASCS, SAP NetWeaver SCS, SAP NetWeaver ERS, and the SAP HANA database use virtual hostname and virtual IP addresses.
- On Azure, a load balancer is required to use a virtual IP address.
- Recommend using Standard load balancer.

# HA for SAP NetWeaver on Azure VMs on SLES with Azure NetApp Files for SAP applications



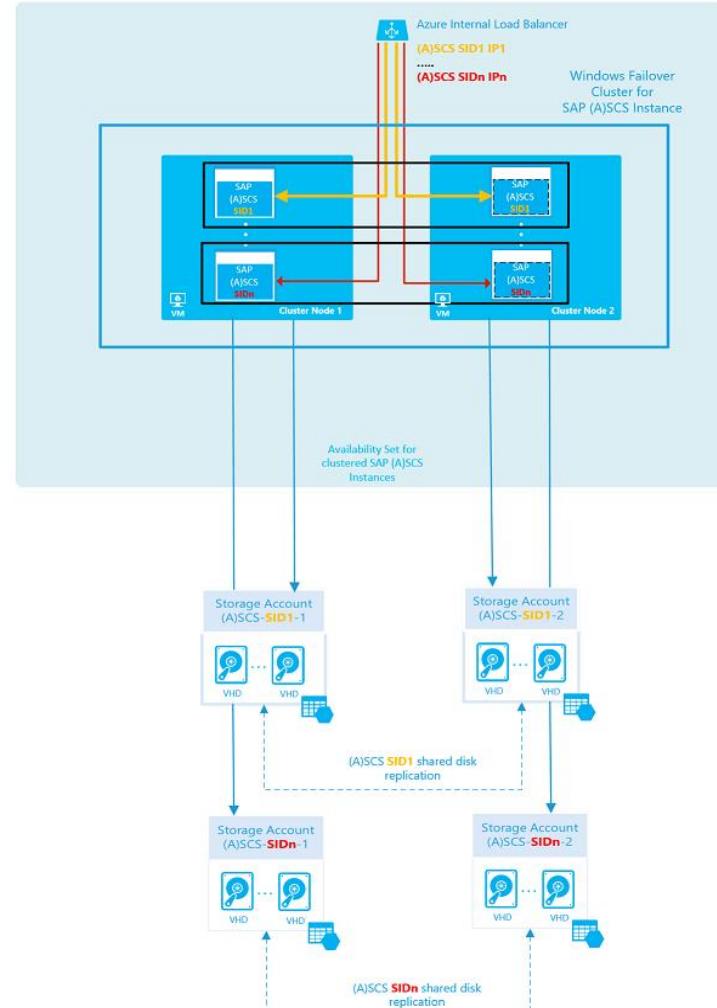
- SAP NetWeaver HA by using shared storage, deployed on Azure NetApp Files.
- Using Azure NetApp Files for the shared storage eliminates the need for additional NFS cluster.
- Pacemaker is still needed for HA of the SAP Netweaver central services(ASCSCS).

# Azure Virtual Machines HA for SAP NetWeaver on RHEL



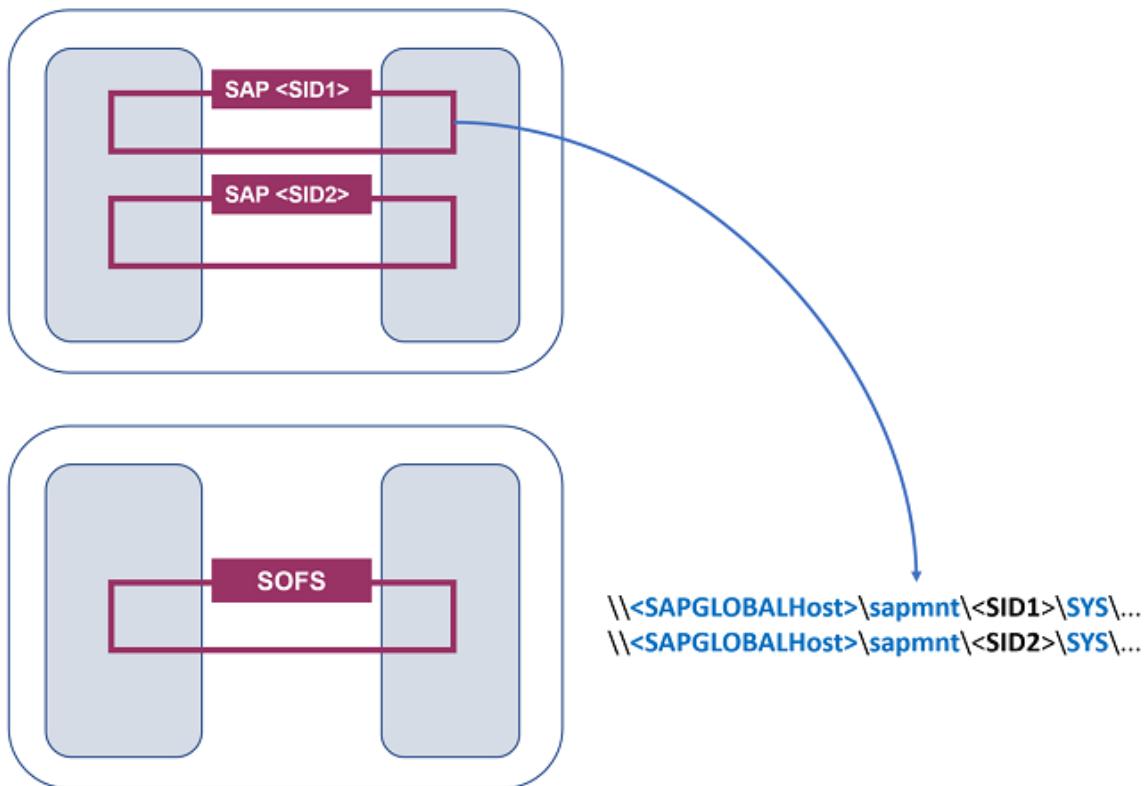
- GlusterFS is configured in a separate cluster and can be used by multiple SAP systems.
- SAP NetWeaver ASCS, SAP NetWeaver SCS, SAP NetWeaver ERS, and the SAP HANA database use virtual hostname and virtual IP addresses.
- On Azure, a load balancer is required to use a virtual IP address.
- We recommend using Standard load balancer.

# HA architecture for an SAP ASCS/SCS instance on Windows (multi-SID configuration)



- Multi-SID is supported only with WSFC.
- Multi-SID is supported using file share and shared disk.

# HA architecture for an SAP ASCS/SCS instance on Windows (multi-SID configuration)



- SAP ASCS/SCS instance multi-SID high availability with Windows Server Failover Clustering and file share on Azure

# Azure VM backup considerations for SAP workloads

- Azure Backup
  - Keep in mind the limitations resulting from the network consumption of backup operations.
  - Azure Backup agents support throttling throughput utilized during backups and restores.
  - Applying compression increases CPU usage of VM.
  - Compressed backups help reduce restore times.
  - Azure VM backup supports only a single scheduled backup per day.

# Azure VM backup considerations for SAP workloads (cont.)

- Backup application consistency
  - For Windows VMs, the Backup service coordinates with VSS to take an app-consistent snapshot of the VM disks.
  - For Linux VMs, to take app-consistent snapshots of Linux VMs, use the Linux pre-script and post-script framework to write your own custom scripts to ensure consistency.

# Azure VM-based DBMS backup considerations for SAP workloads

- Two types of backups must be performed for database backup
  - Database full and differential backups
  - Transaction log backups
- Storage snapshots of database don't replace transaction log backups.
- File-snapshot backups are useful for SAP administrative tasks, such as applying SAP support packs.

# SAP HANA backup considerations for SAP workloads

- SAP HANA on Azure VMs can be backed up by using the following 3 possibilities.
  - HANA backup through Azure Backup Services
  - HANA backup to the file system in an Azure Linux Virtual Machine
  - HANA backup based on storage snapshots using the Azure storage blob snapshot feature manually or Azure Backup service
- SAP HANA backup scheduling strategy
  - Storage snapshot (daily)
  - Complete data backup using file or backint format (once a week)
  - Automatic log backups

# Azure VM monitor considerations for SAP workloads

- The solution developed to enable SAP Monitoring is based on the concept of Azure VM Agent and its extensions.
- Azure VM Agent
  - Deployed by default on VM creation for windows VM
  - Included in Azure Marketplaces image for SUSE, Red Hat and Oracle Linux
  - Need to install manually for custom VM images
- Azure Monitoring Extensions for SAP
  - The SAP monitoring tools SAPOSCOL, or SAP Host Agent, retrieve Azure VM telemetry via an Azure Monitoring Extension for SAP.
  - Allows SAP to collect important performance counters and display those via SAP transactions ST06 and OS07.
- Update of the configuration will be required if you change the number of disks attached to the Azure VM hosting the SAP workload, add new network interfaces to it, or change its size.

# Azure VM security considerations for SAP workloads

- For network security, consider implementing a perimeter network, with a managed or hosted firewall in front of the subnet for Web Dispatcher.
- For storage security, ensure that data is encrypted in transit and at rest.
- Data on the virtual machine disks is encrypted at rest in Azure storage.
- For SAP HANA data-at-rest encryption, we recommend using the SAP HANA native encryption technology.

# Azure VM authentication and access control considerations for SAP workloads

- In cross-premises scenarios, Active Directory from on-premises can be extended to serve as the authentication mechanism through an Azure deployed domain controller.
- Azure AD can synchronize users with customer's on-premises AD, but Azure AD is explicitly different from on-premise AD, and customers will likely continue to require full AD servers deployed in Azure.
- Place Azure VMs hosting domain controllers into the same availability set for providing enough resiliency.
- To improve performance by localizing authentication traffic, collocate domain controllers with SAP servers within the same Azure virtual network.
- Control access to resources by using a centralized identity management system at all levels:
  - Provide access to Azure resources through role-based access control (RBAC).
  - Grant access to Azure VMs through LDAP, Azure Active Directory, Kerberos, or another system.
  - Support access within the apps themselves through the services that SAP provides, or use OAuth 2.0 and Azure Active Directory.

# SAP HANA on Azure (Large Instances) compute, network, and storage

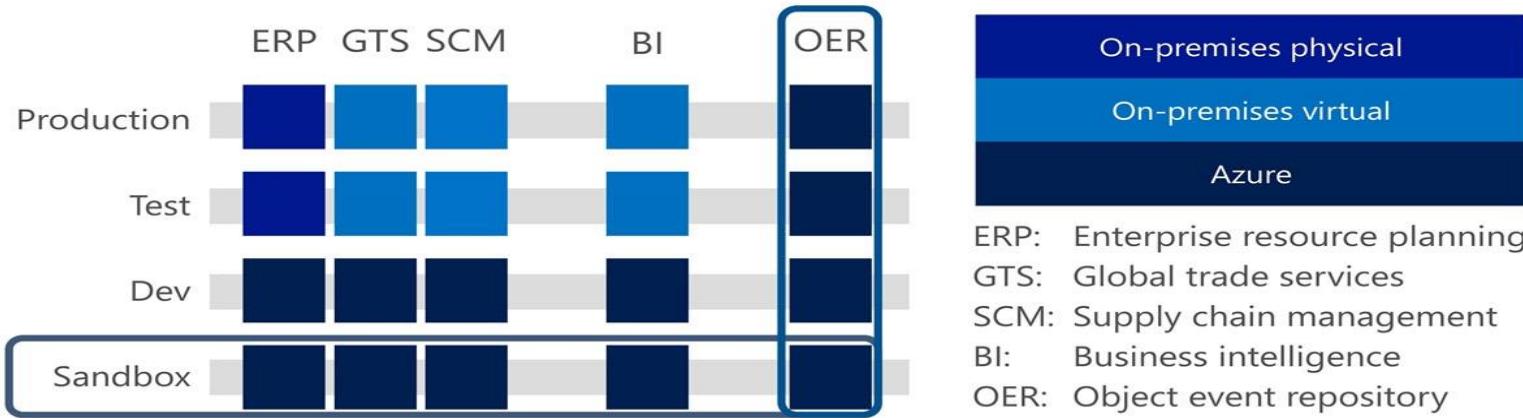
- SAP HANA Large Instances
  - Microsoft helps establish the large instance setup, but it is your responsibility to verify the operating system's configuration settings.
  - Sizing for HANA Large Instance is no different than sizing for HANA in general.
  - For green field implementations, SAP QuickSizer is available to calculate memory requirements of the implementation of SAP software on top of HANA.
- Storage considerations
  - The storage volumes are attached to the HANA Large Instance units as NFS4 volumes.
  - To support high availability at the primary site, use different storage layouts.
  - Another high availability option is application-based replication such as HSR.
  - For DR, however, a snapshot-based storage replication is used.
  - The storage used in HANA Large Instances has a file size limitation of 16 TB.

# SAP HANA on Azure (Large Instances) compute, network, and storage (cont.)

- ExpressRoute networking considerations
  - The HLI units of your customer tenant are connected through another ER circuit into your virtual networks. To separate load conditions, the on-premises to Azure virtual network ER circuits and the circuits between Azure virtual networks and HLI don't share the same routers.
  - The workload profile between the SAP application layer and the HLI consists typically of small requests and burst data transfers (result sets) from SAP HANA into the application layer.
  - The SAP application architecture is more sensitive to network latency than typical scenarios where data is exchanged between on-premises and Azure.
  - The Azure ExpressRoute gateway has at least two ER circuits: one circuit that is connected from on-premises and one that is connected from HLI. This leaves only room for another two additional circuits from different MSEEs to connect to on ExpressRoute Gateway. All the connected circuits share the maximum bandwidth for incoming data of the ExpressRoute gateway.

# Prepare to migrate SAP workloads to Azure

# Strategies for migrating SAP workloads to Microsoft Azure



## Horizontal Strategy

- Migrate by system type (sandbox, development, test, DR, production)
- Start with low risk sandbox and development systems
- Establish migration runbook (iterate) with each migration run
- Drives: faster migration of a larger number of systems and servers

## Vertical Strategy

- Migrate by SAP application / business functionality
- Cherry-pick lower risk SAP applications (low business impact in case of issues)
- Move to higher-value SAP applications with bigger business impact
- Drives: faster migration of production systems, thus faster learnings

# Create a checklist for SAP workload planning and deployment

High-Level Design Document

An inventory of all SAP interfaces (SAP and non-SAP)

Design of Foundational Services

Microsoft Premier Support Contract reference

Technical Design Document

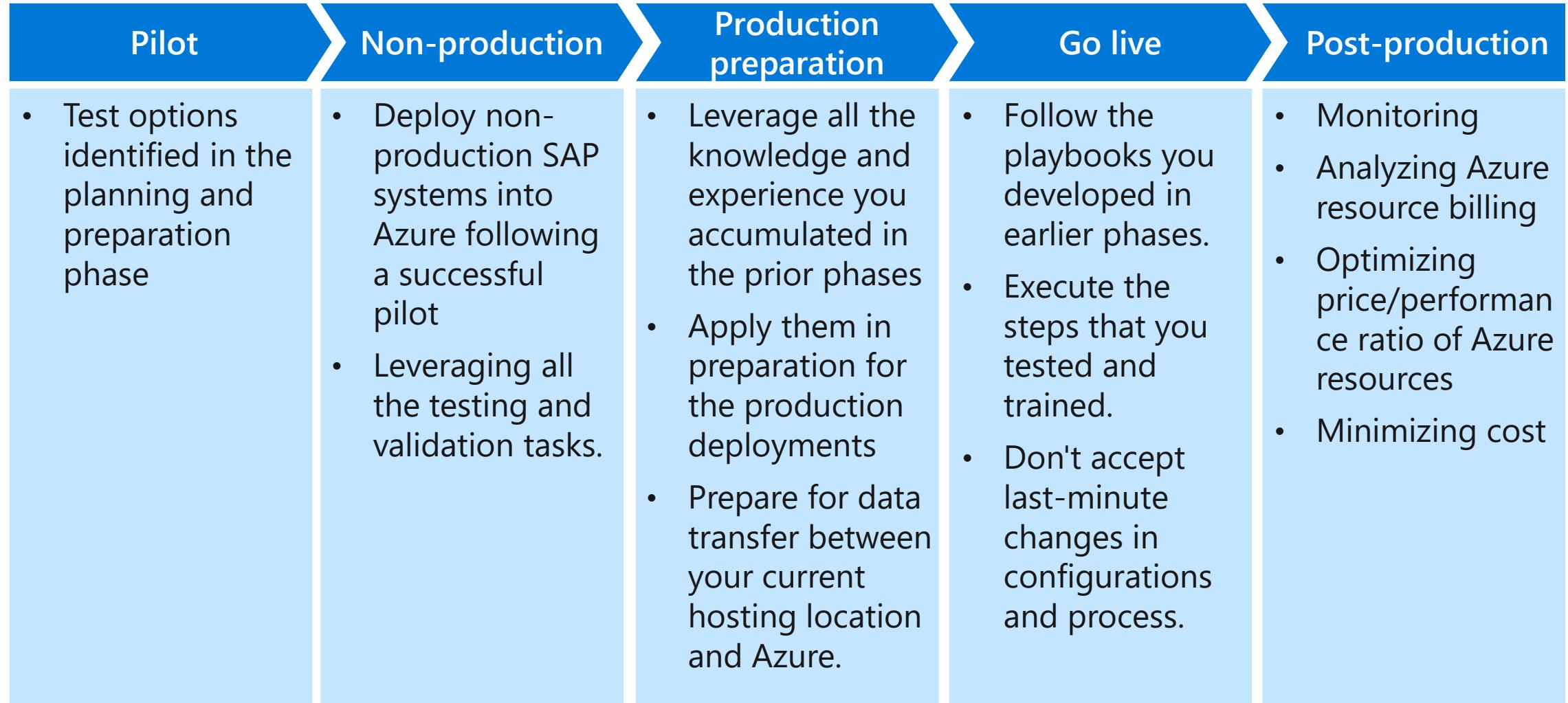
The list of Azure subscriptions and their respective core quotas

Data reduction and data migration plan for transferring SAP data into Azure (in migration scenarios)

Automated deployment approach

- A solution block diagram
- Sizing of compute, storage and networking components in Azure
- High Availability and Disaster Recovery architecture
- Detailed inventory of OS, DB, Kernel, and SAP support pack versions
- 3-Tier designs for SAP production systems (strongly recommended over 2-Tier designs)

# Migration Phases



# Q&A

# Reach out to the team



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# SAP on Azure Enablement

Next Session – Introduction to various SAP on Azure Teams

Wednesday, Oct 7, 2020, 10am SGT

