



SAP on Azure Planning Azure for SAP workloads & Introduction to various teams

Wednesday, October 7th, 2020

10am – 11 am SGT

Ravi Gangampali
Microsoft APAC

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SAP on Azure Partner Enablement

Module One – Week Three

Day 3 – Planning Azure for SAP workloads
Cont & Teams Intro



Inseob Kim
Cloud Solution Architect



Ravi Gangampalli
Cloud Solution Architect– SAP on Azure

Agenda

Introduction to SAP on Azure Teams

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>



SAP on Azure Center of Excellence

- **Global Black Belt (GBB)**, providing high-level solution design and technical pre-sales services
- **One Commercial Partner (OCP)**, working with partners to enable for SAP on Azure, Partner Development planning and help with opportunities
- **Azure FastTrack (FT)**, working with customers and partners on the implementation & best-practices toward a successful deployment
- **Customer Advisory Team (CAT)**, detailed and complex architecture design for the most strategic customers, review of project milestones and go-live support
- **Technical Delivery and Engineering Team (MS Engineering)**, receiving feedback about customers' needs, build & facilitate new & innovative solutions for running SAP workloads on Azure
- **Microsoft Internal IT Team (MSIT)** sharing best-practices and reference architecture about running SAP on Azure



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.

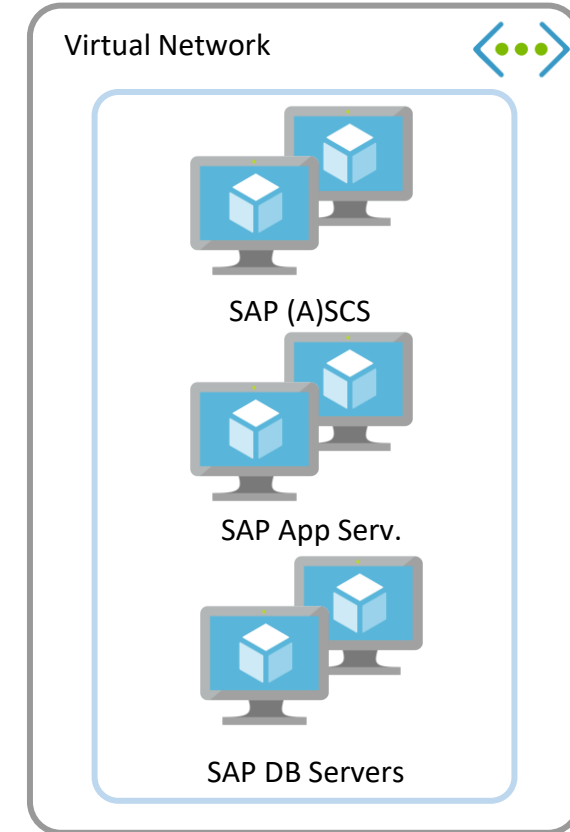
Multi-tier architecture for SAP workloads

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)

Create project 'ECC1'

Customer no. 31910

Project Name ECC1

☐ Limit User Access

Exit

Classic

Search

Search in Tree

☐ Match whole word Phrase

Input Navigation Tree

- ▼ SAP Business Solutions
 - Project Information
- ▼ SAP Business Suite
 - SAP Fiori
 - ▶ SAP CRM
 - ▶ SAP Web Channel Experience Mgmt.
- ▼ SAP ERP
 - ▼ Financials
 - Contract Accounting
 - [Biller Direct](#)
 - ▼ Human Capital Mgmt.
 - E-Recruiting

Check Input Use Default Values Less Details Clear Questionnaire

Financials -> Contract Accounting : Change

Avg. workday Start End Peak load Start End

09:00 18:00 12:00 13:00

Table 1: Throughput - Standard Background Sizing - CPU

Delete/Clear Insert The buttons in this line only work for marked lines in the lower table.

Element	Element short text	A/P	TI
<input type="checkbox"/> CIT-RERA	Chargeable Items ReRating	P	P
<input type="checkbox"/> BIT-BILL	BIT Billing	P	P
<input type="checkbox"/> LOAD-BILL	Load Billing	P	P
<input type="checkbox"/> LOAD-INV	Load Invoicing	P	P
<input type="checkbox"/> CONV-INV	Convergent Invoicing	P	P
<input type="checkbox"/> DUNNING	Dunning	P	P

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

Delete/Clear Insert The buttons in this line only work for marked lines in the lower table.

Element	Element short text	A/P	TI
<input type="checkbox"/> CIT-UPPL	Chargeable Items Upload	P	P
<input type="checkbox"/> CIT-RATE	Chargeable Item Rating	P	P
<input type="checkbox"/> BIT-UPPL	BIT Upload	P	P
<input type="checkbox"/> PAY-RUN	Payment Run	P	P
<input type="checkbox"/> CD-PL	Payment Lots	P	P
<input type="checkbox"/> CORR-PRINT	Correspondence Print	P	P
<input type="checkbox"/> 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

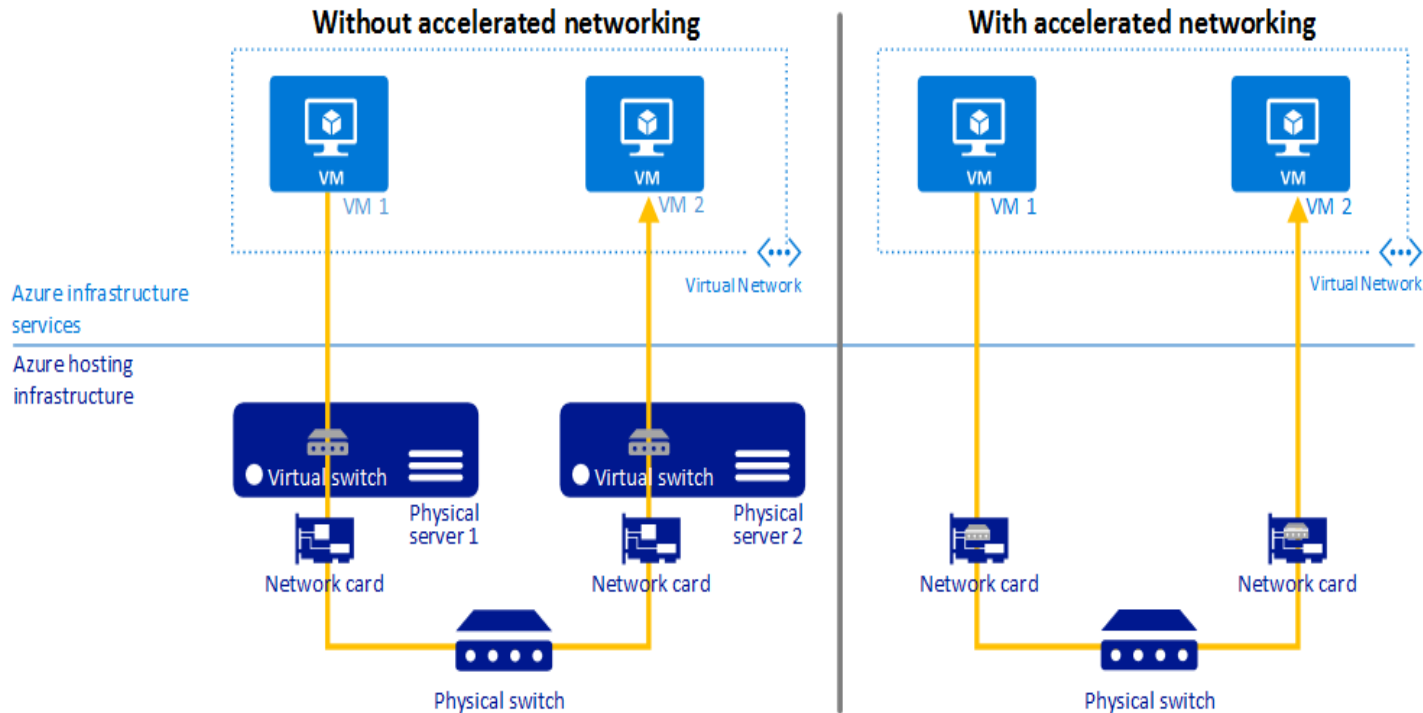
Sizing for Azure

	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	-				
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

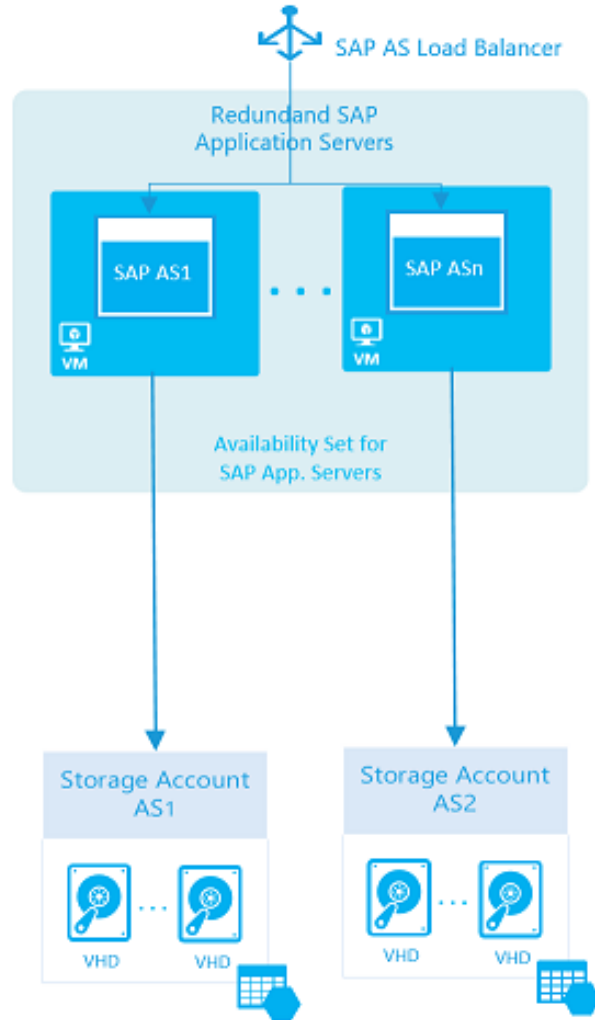
- Refer to recommendations when configuring the paging/swap file
- The use of managed disks is recommended for all SAP workloads.
- Recommends using Azure Premium SSD Storage for most workloads
 - except of SAP application workload and non-performance sensitive DBMS
- Using Multi-disk volume with stripe 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:

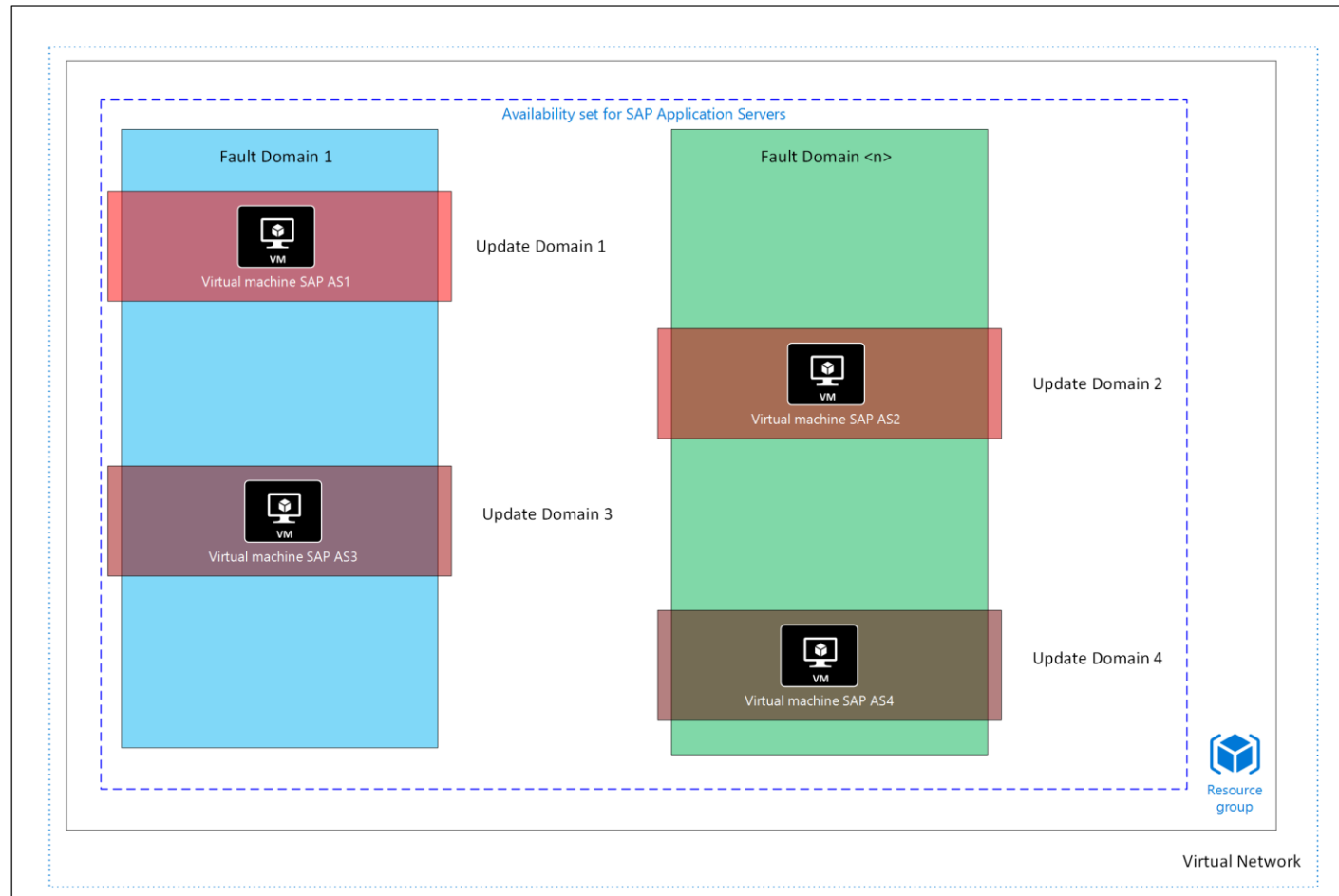
HA of SAP workloads	HA capabilities of Azure infrastructure
<ul style="list-style-type: none">• SAP application servers• SAP ASCS/SCS instance• DBMS server	<ul style="list-style-type: none">• Azure VM restart• High availability of compute (VMs), network, and storage, based on:<ul style="list-style-type: none">• Availability Sets• Availability Zones

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.)

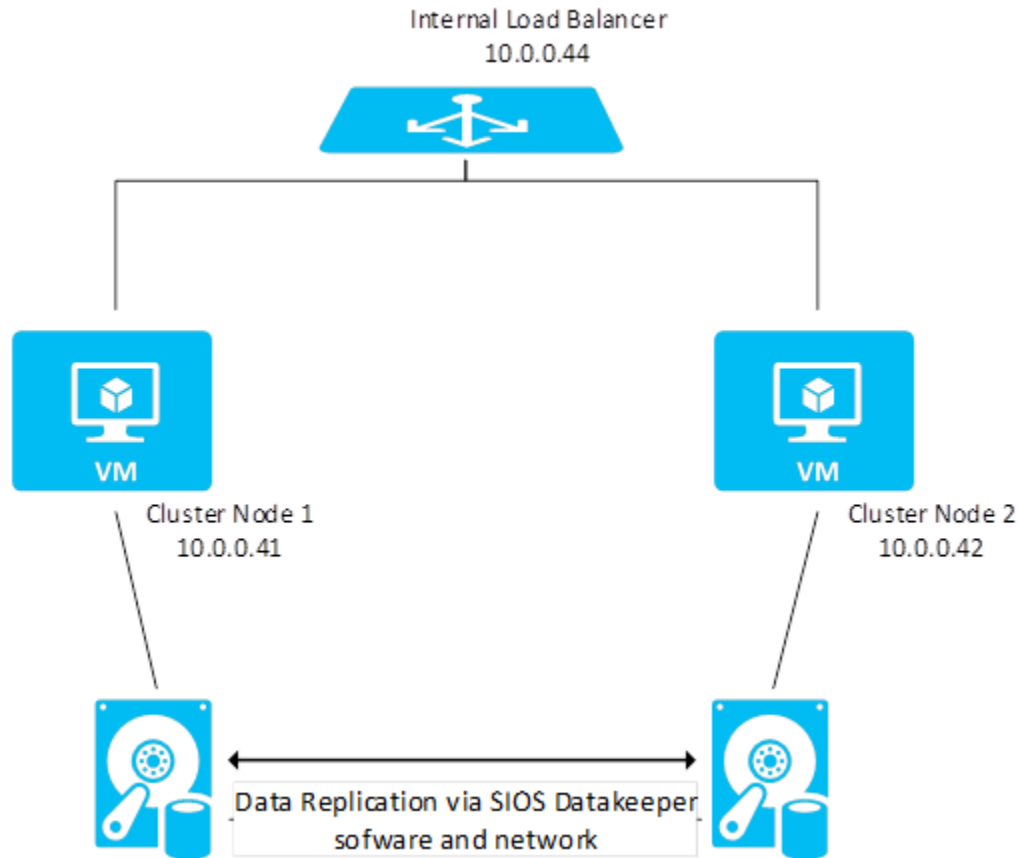


- Each Azure VM belongs to a different upgrade domain
- Each Azure VM belongs to a different fault domain

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)



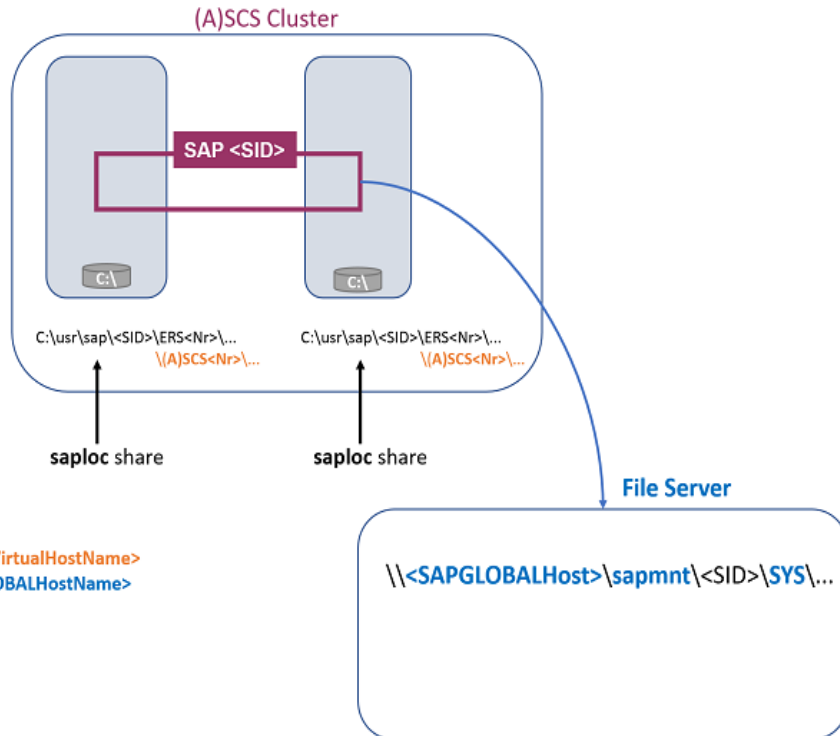
- Use a Windows Server Failover Clustering (WSFC) solution to protect the SAP ASCS/SCS instance.
- Cluster the SAP ASCS/SCS instance by using clustered shared disks.
- Such disks can be implemented by using third-party solutions, such as SIOS DataKeeper.

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

Legend:



Local Disk:



ASCS / SCS Virtual Host Name = <(A)SCSVirtualHostName>
SAP Global Hostname = <SAPGLOBALHostName>

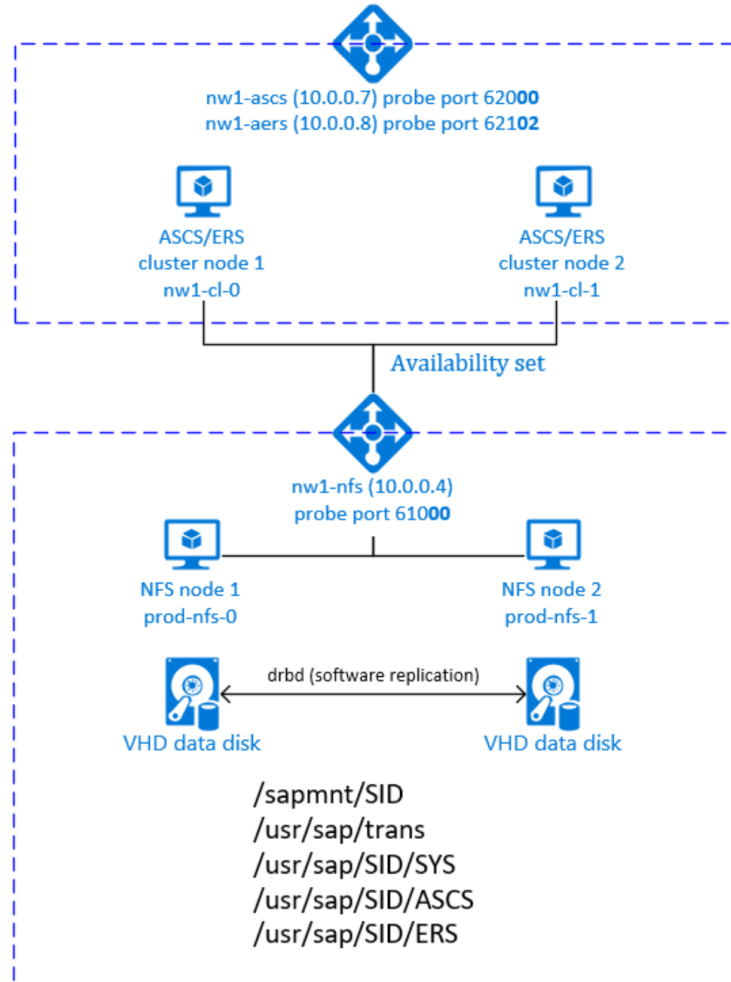
- Cluster the SAP ASCS/SCS instance by using file share.
- Access the /sapmnt global directories via a UNC path.
- A highly available UNC /sapmnt share can be implemented by using Windows Server Failover Cluster with Scale Out File Server (SOFS) and the Storage Spaces Direct (S2D) feature in Windows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

SAP ASCS/SCS HA architecture with an SMB file share

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

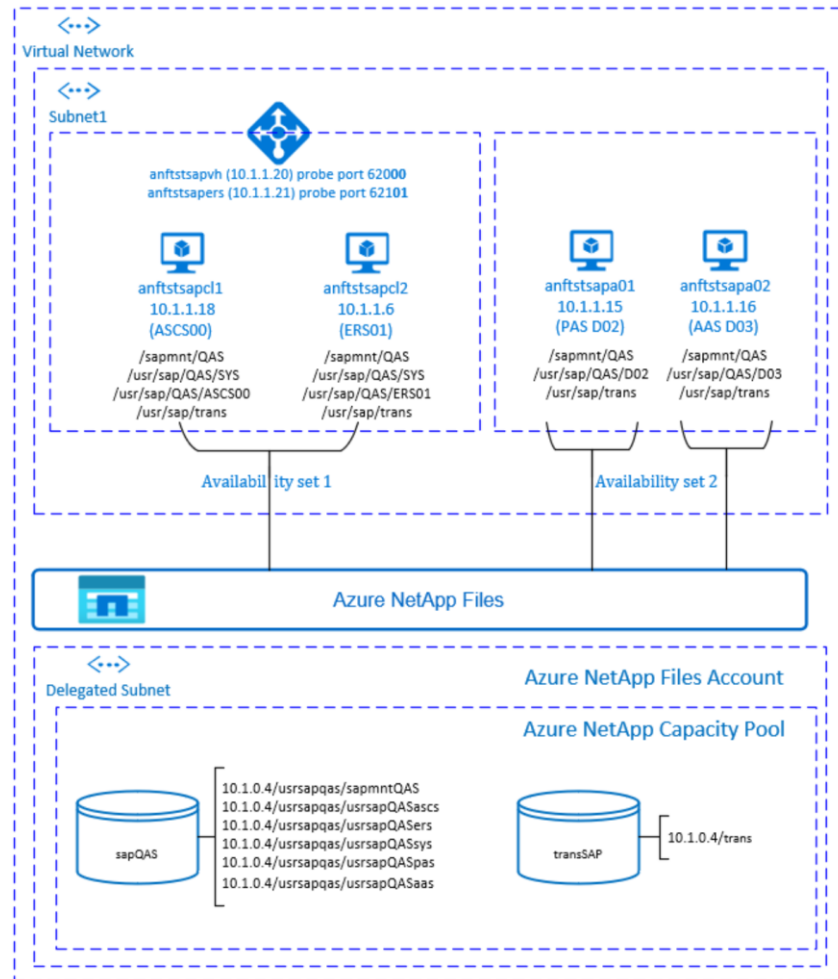
- Require the use of Linux clustering, Pacemaker with STONITH
- Require a highly available NFS share, which can be provisioned by
 - Using Azure VMs in a separate cluster
 - Azure NetApp Files
 - Red Hat GlusterFS

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



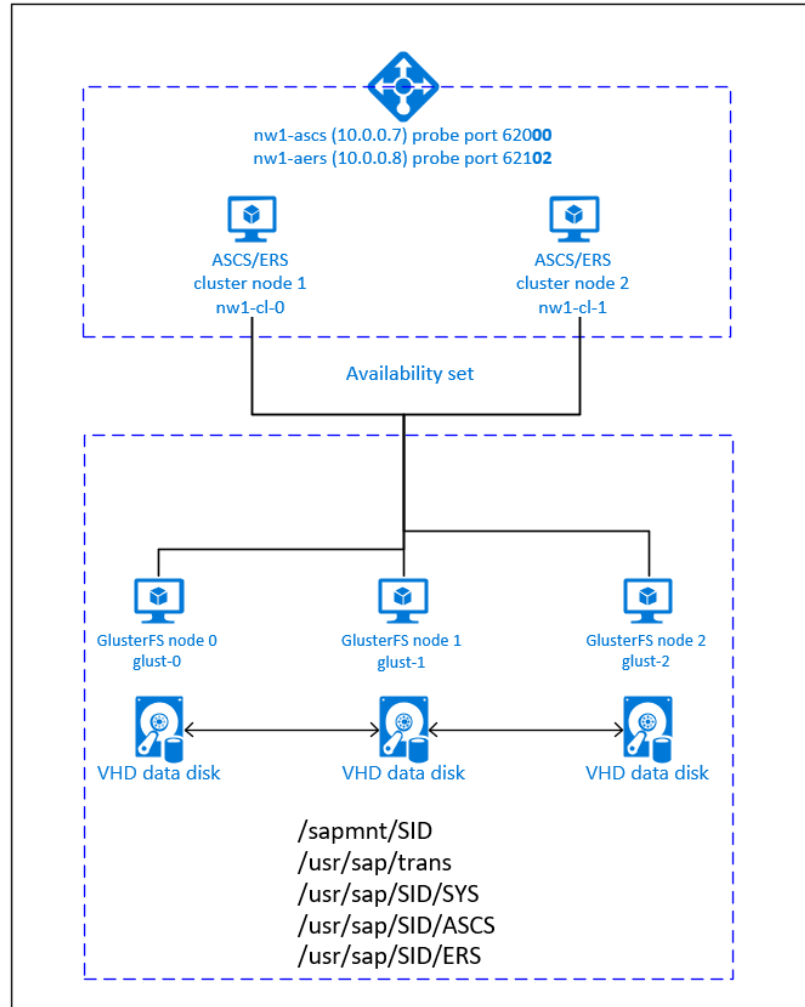
- SAP NetWeaver requires an NFS server.
- The NFS server is configured in a separate cluster and can be used by multiple SAP systems.
- The NFS server, SAP NetWeaver ASCS, SAP NetWeaver SCS, SAP NetWeaver ERS, and the SAP HANA database use virtual hostname and virtual IP addresses.
- On Azure, a load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



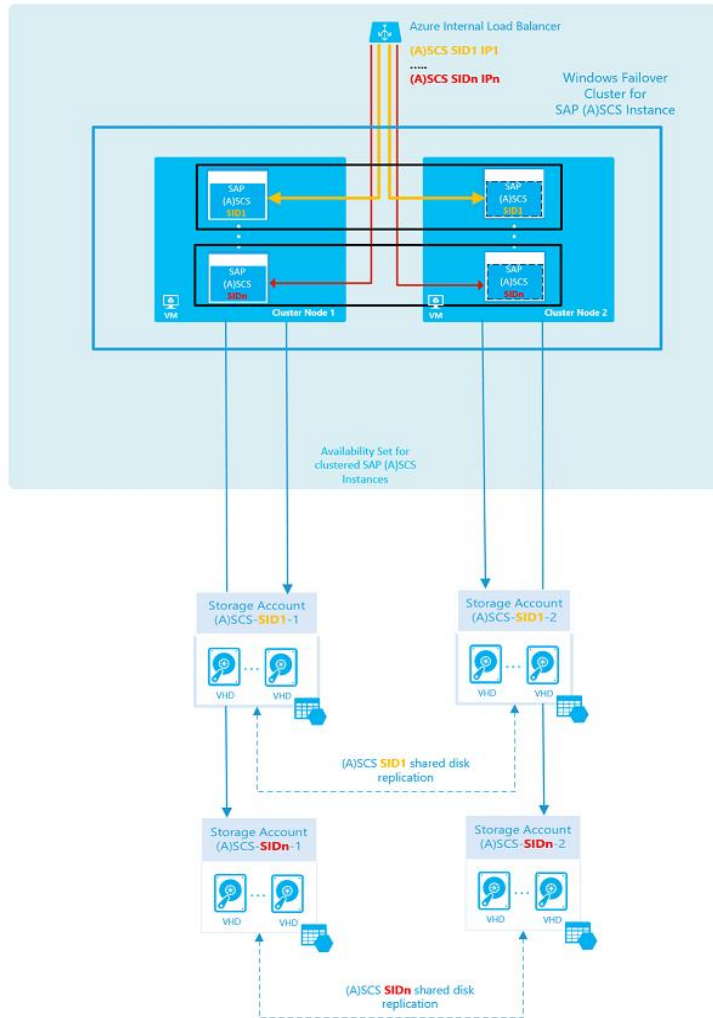
- SAP NetWeaver HA by using shared storage, deployed on Azure NetApp Files.
- Using Azure NetApp Files for the shared storage eliminates the need for additional NFS cluster.
- Pacemaker is still needed for HA of the SAP Netweaver central services(ASCS/SCS).

Azure Virtual Machines HA for SAP NetWeaver on RHEL



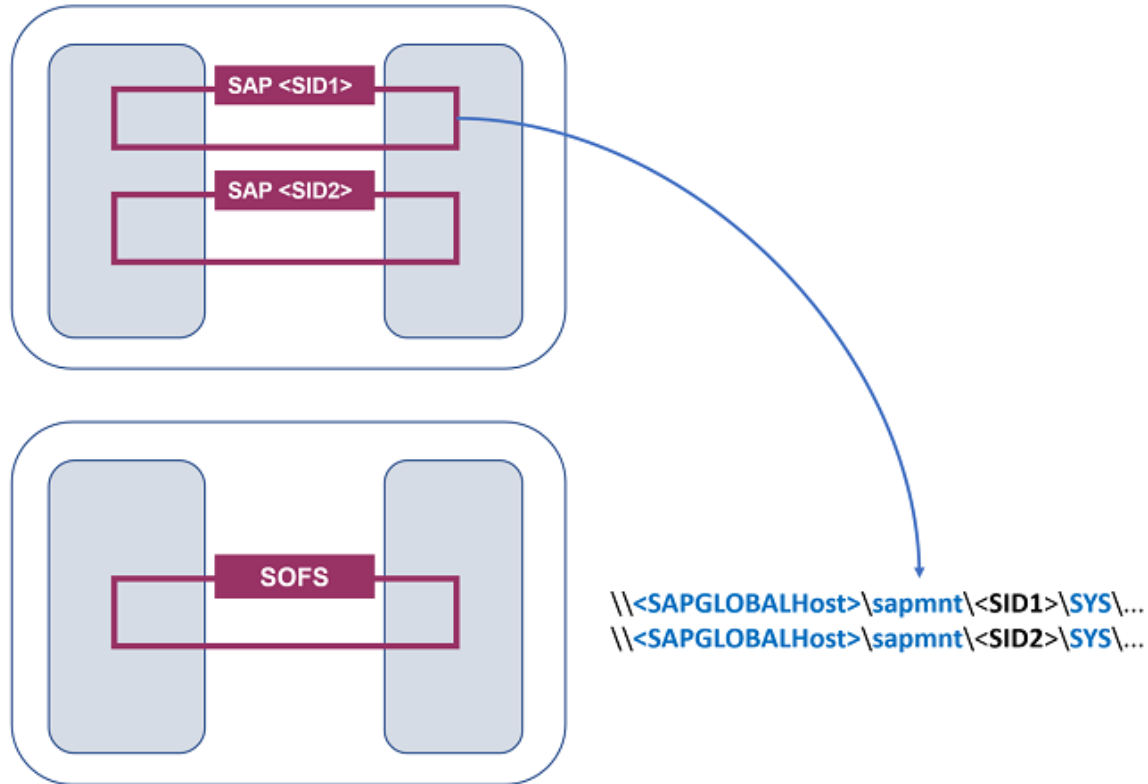
- GlusterFS is configured in a separate cluster and can be used by multiple SAP systems.
- SAP NetWeaver ASCS, SAP NetWeaver SCS, SAP NetWeaver ERS, and the SAP HANA database use virtual hostname and virtual IP addresses.
- On Azure, a load balancer is required to use a virtual IP address.
- We recommend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

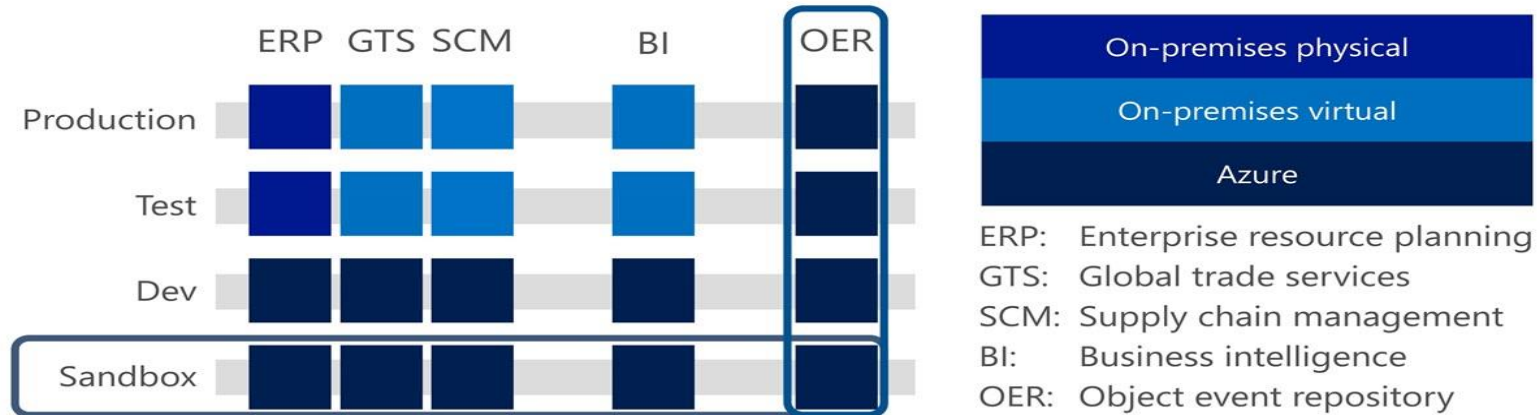
- SAP HANA Large Instances
 - Microsoft helps establish the large instance setup, but it is your responsibility to verify the operating system's configuration settings.
 - Sizing for HANA Large Instance is no different than sizing for HANA in general.
 - For green field implementations, SAP Quick Sizer 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 MSEs 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

Pilot	Non-production	Production preparation	Go live	Post-production
<ul style="list-style-type: none">• Test options identified in the planning and preparation phase	<ul style="list-style-type: none">• Deploy non-production SAP systems into Azure following a successful pilot• Leveraging all the testing and validation tasks.	<ul style="list-style-type: none">• Leverage all the knowledge and experience you accumulated in the prior phases• Apply them in preparation for the production deployments• Prepare for data transfer between your current hosting location and Azure.	<ul style="list-style-type: none">• Follow the playbooks you developed in earlier phases.• Execute the steps that you tested and trained.• Don't accept last-minute changes in configurations and process.	<ul style="list-style-type: none">• Monitoring• Analyzing Azure resource billing• Optimizing price/performance ratio of Azure resources• Minimizing cost

Key Takeaways from Module One

Objectives

Clear
Understanding of
program objectives

Foundations for Tech

Built foundations of Azure for SAP

Foundations for Sales

Built Sales Fundamentals of
SAP on Azure

Q&A

Reach out to the team



Ravi Gangampalli



Sajit Nair



Nicolas Yuen



Inseob Kim

Survey



<https://aka.ms/SAPAPAC-POE-FEEDBACK>

sap-on-azure-pe-apac@microsoft.com



SAP on Azure Enablement

Next Session

Azure Introduction Recap & Architecting session kick-off

Monday, Oct 12, 2020, 10am SGT

Reach out to the team
sap-on-azure-pe-apac@microsoft.com

