Get a Clear Path to SAP HANA in the Cloud

Big changes are on the horizon for many SAP HANA users. Today's cloud computing capabilities can help ease the upcoming transition by securely and cost-effectively supporting HANA and your other SAP applications. SUSE and Microsoft Azure have partnered to deliver the powerful, scalable cloud platform that can best drive your digital transformation and enhance your business agility.

Table of Contents

SUSE and Microsoft Azure: Optimized for SAP HANA in the Cloud

SAP's strategy to use SAP HANA as the database for all SAP applications has forced many enterprises to reconsider their IT infrastructures in a big way.

That's because SAP HANA runs only on Linux. Fortunately, there are more options than ever today. Together, SUSE and Microsoft Azure offer an SAP-certified cloud platform that reduces the complexity of migration and deployment of SAP HANA and SAP applications in the cloud. The combined solution empowers you to simplify infrastructure management, improve time to market and lower costs.

Target Audience
This white paper is meant for CIOs, solution architects and technical architects who already deploy or are planning to deploy SAP solutions, as well as those interested in moving to a full cloud or hybrid cloud solution. This paper contains links in various sections to more technical guides for those in search of more detailed information.

Extending the Value of Your SAP Applications
Today, many SAP customers around the world are transitioning to new infrastructure so they can continue to run their SAP applications past 2025. That's when SAP will end support for its old products and move completely to SAP S/4HANA. Thanks to the latest advancements in cloud computing, a lot of them are opting for full cloud or hybrid environments to run their SAP solutions. Multiple public cloud providers are now certified for SAP

workloads, and an increasing number of organizations are moving both production and non-production workloads to the cloud.

By running your SAP landscape, including SAP HANA, on Microsoft Azure and SUSE® Linux Enterprise Server for SAP Applications, you can benefit from the agility and reduced costs of cloud computing while still getting the high performance and uptime your business requires. Together, SUSE and Microsoft Azure create the most powerful, scalable cloud platform for SAP landscapes today.

"SAP and Microsoft are working together to create an end-user experience built on unprecedented insight, convenience and agility. The certification of Microsoft Azure's infrastructure services for SAP HANA, along with the new integration between Microsoft Office 365 and cloud solutions from SAP, are emblematic of this major paradigm shift for the enterprise."

BILL MCDERMOTT
CEO
SAP

The Power of SAP Solutions with the Agility of the Cloud

SUSE and Microsoft Azure have a long history of shared success, and both have more than 20 years of working closely with SAP.

Azure is the most powerful cloud offering for SAP HANA, with options for virtual machines or bare-metal infrastructure that can support the largest SAP HANA workloads of any hyperscale public cloud provider. Together, Azure, Microsoft Office 365 and Microsoft PowerBI offer an ecosystem that enables you to combine SAP HANA with the data sources that supply it.

SUSE Linux Enterprise Server for SAP Applications is the leading platform for SAP solutions on Linux, and the recommended and supported operating system of choice for SAP HANA. SUSE constantly works with SAP to ensure the best performance. SUSE was also named an SAP HANA Innovation Award Winner 2017 . Thanks to our tight integration with Microsoft and SAP engineering teams, SUSE has unique insight into the latest developments in Microsoft SAP HANA on Azure Large Instances.

The combined solution of SUSE Linux Enterprise Server for SAP Applications and Microsoft Azure is certified by SAP for SAP HANA. SUSE and Microsoft engineered the solution together to optimize options for customers running on Azure. Azure also offers broad database support so you can bring in existing SAP and non-SAP applications that are using Oracle, SQL Server, DB2, SAP ASE and maxDB.

With SUSE and Microsoft Azure, you get multiple purchasing options, including on-demand, bring your own subscription (BYOS) and enterprise agreement. Technical support is integrated, which means you can call one Microsoft phone number and get help with SAP and SUSE products as well. You can also bring your own subscription of additional SUSE products such as SUSE Manager, for simple management of your Linux installation, and SUSE Linux Enterprise Live Patching, which can help reduce planned downtime.

Use Cases for SUSE and Microsoft Azure for SAP HANA

The combined power of Microsoft Azure and SUSE Linux Enterprise Server for SAP Applications makes it easy to handle a variety of workloads. You can quickly deploy the solution to support your SAP applications on Azure and pay as you go. This allows you to circumvent the long lead times, upfront investments and hardware management that comes with on-premises deployments.

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1 **www.suse.com/communities/blog/suse-receives-sap-hana-innovation-award-2017-industry-disruptor/**

Scenarios

Development and Testing
Quickly provision development and test environments with the ability to stop the environments at any time

Production Environments
Get the scale and reliability you need for your production environment

Disaster Recovery
Keep environments for recovery purposes without additional cost

Archiving
Archive data and the corresponding SAP systems so they are always available and ready for audit (without running up costs)

Benefits

40-75%
total cost of ownership (TCO) savings

Faster Provisioning
minutes instead of days

60%
lower storage costs

Higher Agility   Lower Costs   Less Complexity   Higher Innovation

SUSE and Microsoft engineering collaboration focuses on delivering a consistently reliable environment for SAP on Azure VMs and Azure Large Instances.

A Closer Look at Microsoft Azure for SAP

Microsoft Azure is a flexible, integrated platform that can operate as a fully public or hybrid cloud solution. It is a growing collection of integrated cloud services—analytics, computing, database, mobile, networking, storage and web—for moving faster, achieving more and saving money.

Enterprise-Grade

As an enterprise-grade cloud platform, Azure is widely trusted—with 90 percent of Fortune 500 companies relying on it.[2] Microsoft is also the only vendor positioned as a Leader across Gartner's Magic Quadrants for Cloud Infrastructure as a Service, Application Platform as a Service and Cloud Storage Services for the second consecutive year.

Microsoft has made a commitment to the protection and privacy of data. Microsoft's compliance policies enable customers to protect their intellectual property with the Azure IP Advantage. You can also take advantage of Microsoft's global scale while adhering to complex regional regulations such as the EU's General Data Protection Regulation (GDPR) and other requirements, which you can learn about on the Microsoft Trust Center.

Hyperscale

Azure operates at hyperscale. It runs on a worldwide network of Microsoft-managed data centers across 42 regions—more countries and regions than Amazon Web Services and Google Cloud combined. This gives you lots of options for running applications and ensuring great customer performance. Azure is also the first multinational cloud provider in mainland China.

It's simple to connect SAP HANA with other cloud applications, from collaboration, document and calendar apps to SAP solutions such as Concur and SAP Fieldglass. Azure also makes it easy to integrate the SAP user experience and those same business applications with Office 365 and advanced Microsoft technologies like Cortana Intelligence and Power BI. You can even securely connect your data center applications to the cloud-based SAP experience through ExpressRoute. Learn more about ExpressRoute here.

Azure's on-demand services can quickly scale up or down to match demand, so you only pay for what you use. Per-minute billing and a commitment to match competitor prices for compute, storage and bandwidth means you can keep costs low without sacrificing performance or capacity.

Flexible

Some cloud providers make you choose between your data center and the cloud. Not Azure, which easily integrates with your existing IT environment through the largest network of secure private connections, storage solutions, and data residency and encryption features. This allows you to extend your existing IT capabilities by easily moving SAP workloads across your data center and Azure. You can run both Windows and Linux applications and databases on Azure—no replatforming required.

SAP HANA Deployment Options on Microsoft Azure

SAP HANA ON AZURE VIRTUAL MACHINES

SAP HANA is certified to run on standard Azure VMs, which offer near-instant deployment capabilities that significantly reduce the barrier to entry and necessary capital planning and budgeting for small to large organizations.

With built-in virtual networking and load balancing; compatibility with Hyper-V virtual machines running on premises; flexibility; and a low cost to run preconfigured VM images offered through the Azure gallery, Azure VMs are easy to deploy and offer operational value for the SAP landscape. That makes it simple to order an Azure VM and SUSE Linux Enterprise Server for SAP Applications image from the Azure marketplace and put SAP HANA to work quickly.

Azure offers various virtual machines types that go up to 4 TB of memory and 128 vCPUs. Learn more about Azure VMs and their SAP certifications here. Note that if you are using on-demand virtual machines on Azure, SUSE maintains global update infrastructure for its own updates and patches, so you can pull updates from a source in your region and not worry about the latency involved in pulling updates from distant locations.

SAP HANA ON AZURE LARGE INSTANCES (HANA LARGE INSTANCES)

Azure Large Instances are bare-metal cloud infrastructure which is SAP HANA TDI certified by SAP. The SAP HANA Large

Instances architecture integrates bare metal and virtualized components to achieve the best of both worlds while still offering hybrid integration with existing environments. They offer a high-capacity, high-performance and highly economic foundation for SAP HANA. You get the convenience of Azure on a private network and infrastructure specifically designed to support HANA. A single node can support up to 20 TB for online transaction processing (OLTP) and up to 60 TB of online analytical processing (OLAP) in scale-out mode.[4]

This offer is unique to Azure and ensures that organizations that outgrow the memory that native VMs can provide are not forced to move off Azure. With HANA Large Instances, Azure provides you a safety net for expanding your business processes in SAP solutions while being able to run on Azure, even with much higher memory demands.

A Closer Look at SUSE Linux Enterprise Server for SAP Applications

The leading Linux platform for SAP HANA, SAP NetWeaver and SAP S/4HANA provides optimized performance and reduced downtime, as well as faster migration and SAP landscape deployments. It is the premier operating environment for SAP solutions.

Reliability and Resilience
SUSE Linux Enterprise Server for SAP Applications comes with high availability extension that allows you to cluster physical servers, virtual guests or any combination of the two. It is SAP-certified for SAP NetWeaver. It helps you maximize your system's flexibility while improving service availability and resource usage. Its easy-to-use graphical user interface (GUI) make cluster configuration and management simple, even simulating failure scenarios before they happen. The high availability extension has a cluster simulator, which lets you test and validate configuration changes before implementing them.

SAP HANA has a business continuity architecture that replicates the in-memory data so administrators can initiate failover to a secondary backup in case of a primary system failure. SUSE Linux Enterprise Server for SAP Applications enhances this capability by providing resource agents that automate that failover action. This means failover happens without needing an action from the administrator, so systems stay up and running even when your IT team is focusing on other projects.

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4 *These figures are current as of May 2017.*

SUSE Linux Enterprise Server for SAP Applications

Reliability and Resilience	**SUSE Linux Enterprise High Availability**	**SAP HANA HA Resource Agents**	**SAP HANA Firewall**	**Remote Storage Encryption Management**	
Performance	**Page Cache Management**	**Performance Configuration and Tuning**			
Ease of Use and Deployment	**Installation Wizard**	**Public Cloud Platform Images**	**S/4 HANA Transition Support**	**SUSE Connect**	**SUSE Package Hub**
Base OS and Support	**SUSE Linux Enterprise Server**	**24/7 Priority Support**	**Extended Service Pack Overlap Support**	**SAP Specific Update Channel**	

SUSE developed and implements two resources agents for this: SAPHanaSR, which performs the actual check of the SAP HANA database instances, and SAPHanaTopology, which runs information about the status and configuration of system replications. SUSE Linux Enterprise Server for SAP Applications currently supports failover automation for all common scale up and scale out SAP HANA scenarios. You can find out more about the SUSE resource agents in our setup guide for system replication and you can also find technical documentation for high availability on Azure here.

In SUSE Linux Enterprise Server for SAP Applications, we have created an SAP HANA specific firewall. This can help prevent unauthorized access to your SAP HANA system and the valuable data that resides in it.

To aid with encryption key management, SUSE provides a key server for the encryption built into the Linux operating system. Normally, during a mount or reboot, the system would need to decrypt the data and would thus require an administrator to enter the key. We remove this manual task by allowing the system to contact the key server itself, thus making for a more efficient and less manual process

SUSE also offers a unique guide to help you secure SUSE Linux Enterprise Server for SAP Applications for running HANA: Operating System Security Hardening Guide for SAP HANA.

Overall Performance

The SUSE-exclusive page cache limit helps protect system performance. Under normal operation, HANA reserves a large pool of memory specifically to allow for fast access to RAM for data processing. This memory is seldom used but is required to allow the database to quickly respond to user or application requests. However, the Linux kernel will swap out rarely accessed memory pages as cache to speed up file system operations. That means the HANA-reserved memory becomes unavailable—and response time suffers. With SUSE, the system administrator can limit the

With SUSE Linux Enterprise Live Patching, you can apply critical security and integrity patches to the Linux kernel without stopping it or rebooting. This can avoid the long reboot times required for large in-memory databases like SAP HANA.

amount of page cache that the kernel uses when there is competition between application memory and page cache. This tuning parameter can prevent the kernel from swapping out the HANA memory, so it's available when you need it.

SUSE Linux Enterprise Server for SAP Applications includes a package that automates optimized settings for SAP applications and SAP HANA. It is also used when you configure and install them using our installation wizard.

Ease of Use and Deployment

The installation wizard speeds the setup of SAP S/4HANA, SAP NetWeaver and other SAP applications by helping you quickly set system parameters for optimal performance. It is based on YaST*, the SUSE GUI admin tool. YaST and the installation wizard are both available in the Azure virtual machine images of SUSE Linux Enterprise Server for SAP Applications.

The Azure virtual machine images also support remote desktop protocol and Active Directory integration, so your administrators can more easily interact with and connect your Linux operating systems to the rest of your IT environment.

Find out how to use Azure Active Directory Domain Services with SUSE Linux Enterprise Server for SAP Applications here.

Base Operating System and Support

SUSE Linux Enterprise Server for SAP Applications comes with priority support and maintenance 24 hours a day, seven days a week from both SUSE and SAP This combined support can help you resolve issues simultaneously with the operating system along with support from SAP for issues with SAP applications.

Subscriptions for SUSE Linux Enterprise Server for SAP Applications include Extended Service Pack Overlap Support, which extends the overlap between the support periods of two consecutive service packs by one year. This allows you to perform service pack migrations within 18 months instead of only six months. You have more flexibility scheduling migrations and more time to test before you perform a migration.

SUSE also offers a dedicated update channel for the SAP-specific features and components in SUSE Linux Enterprise Server for SAP Applications. This is in addition to the update channels for the base operating system and the high availability extension.

SUSE and Microsoft Azure: The Right Choice for SAP HANA in the Cloud

To sum up, SUSE and Azure help you gain flexibility and agility by getting out of the data center business and trusting in a jointly developed solution for SAP HANA that provides true enterprise support. Get deep relationships, the enterprise-grade security and the high performance you need to support your organization's growth worldwide.

Learn More

Learn more about how SUSE and Microsoft Azure can simplify your SAP solution deployment and operations at: **www.suse.com/promo/cloud/public/azure/sap-hana/**

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