SLES for SAP HANA On Azure

Make a perfect OS image for your HANA systems

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Microsoft
What We Will Cover...

• SAP HANA on Azure – Options and possibilities
• What it takes to make a perform OS image for HANA?
• Configure your operating system to run HANA optimally
• High availability setup and configuration
• Important learnings
Disclaimer

The information shared is as of mid Feb 2019. Always check Azure, SAP, and SUSE latest documentation for recent information.
The Challenge for SAP customers…
The challenge

Journey to SAP HANA
Mission Critical SAP Application Requirements

- **Scale & headroom for production**
- **Agile IT operations**
- **Application dev agility & innovation**
- **HANA & new app certification**
- **Security & compliance**
- **Business continuity**
- **Cloud economics**
- **Coexistence with current SAP apps & DBs**

Relationship with SAP

Enterprise DNA

Cloud Leadership

SI Ecosystem
SAP On Azure
A combination of VMs and purpose-built large instances provides the largest scale and widest range for SAP HANA

- Purpose-built infrastructure for SAP HANA
- Single node supports up to 24TB for OLTP, and 120TB OLAP in scale-out mode
- 99.99% SLA (High availability)
- SAP certified

- On-demand infrastructure
- Single VM up to 4TB (12 TB announced)
- SLA: 99.9% (Single VM) or 99.95% (high availability)
- Per second billing
- SAP certification
On-demand infrastructure for SAP HANA

- Hyper-threaded M-series VMs
- Intel® Xeon® E7-8890 v3 processor
- DDR4 memory
- <1ms latency for storage writes through Azure Write Accelerator
- Flexible CPU to memory options
- Available in 10 regions
- On demand pricing
- Up to 82% savings with 3-year reserved VM instances
- Deployment in minutes with automation templates

<table>
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<tr>
<th>Size</th>
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<th>M128</th>
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<td>219</td>
<td>512</td>
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<td>128</td>
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</table>
Purpose-built infrastructure for SAP HANA

- Offers OLTP to 24TB, scale out S/4 to 96 TB and OLAP scaled out to 120TB
- 99.99% SLA for HA pairs or scale out N+M
- Auto failover for both N+M and N+N
- Over 70 choices for every workload type and price/performance
- Intel® Xeon® processor E7-8890 v4
- Built-in online backup in seconds with snapshots
- Available in 8 regions in US, EU, AU, and JP
Purpose-built infrastructure for SAP HANA

HANA on Azure Large Instance (OLTP)

- S960m
- S768m
- S768xm
- S576m
- S576xm

M-series VMs (OLTP/OLAP)

- M128s
- M128ms
- M64s
- M64ms
- M32ts M32ls M32ms
- M16ms
- M8ms

- S192
- S192m
- S192xm
- S384
- S384m
- S384xm
- S384xxm

Scale-out

Perf OLAP Certified Prod

Price OLTP TDIv5 Non Prod

5760 vCPUs

960 vCPUs

128 vCPUs

192 GB 768 GB 4 TB 8 TB 12 TB 24 TB 60 TB 120TB
Before you build the image…
Review your decision…
What OS versions are supported for HANA?

**SAP HANA 1.0 (Intel based)**

- **SLES 15 for SAP Applications**
  - 15 (GA) (HANA 1.0 SPS12 revision 122.21 and newer)

- **SLES 12 for SAP Applications**
  - 12 SP4 (HANA 1.0 SPS12 revision 122.22 and newer)
  - 12 SP3 (HANA 1.0 SPS12 revision 122.15 and newer)
  - 12 SP2 (HANA 1.0 SPS12)
  - 12 SP1 (HANA 1.0 SPS12)
  - 12 (GA) (HANA 1.0 SPS10 and newer)

- **SLES 11 for SAP Applications**
  - 11 SP4 (HANA 1.0 SPS10 and newer)
  - 11 SP3 (HANA 1.0 SPS10 and newer)
  - 11 SP2 (up to HANA 1.0 SPS11)

**SAP HANA 2.0 (Intel based)**

- **SLES 15 for SAP Applications**
  - 15 (GA) (HANA 2.0 SPS03 revision 34 and newer)

- **SLES 12 for SAP Applications**
  - 12 SP4 (HANA 2.0 SPS03 revision 35 and newer)
  - 12 SP3 (HANA 2.0 SPS02 revision 23 and newer)
  - 12 SP2 (HANA 2.0 SPS01 and newer)
  - 12 SP1 (HANA 2.0 SPS00 and newer)
What Azure SKUs are supported for HANA?

25 SKUs are available

- DS14v2
- GS5
- M Series
- S Series (aka Large Instances)

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<thead>
<tr>
<th>Vendor</th>
<th>Instance Type</th>
<th>RAM</th>
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<tr>
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<td>M64s</td>
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<tr>
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<td>Microsoft Azure</td>
<td>S144m</td>
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<tr>
<td>Microsoft Azure</td>
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What SLES4SAP images are offered in Azure?

BYOL or PAYG options for VM

- SLES for SAP 12 SP2
- SLES for SAP 12 SP3
- SLES for SAP 12 SP4
- SLES for SAP 15

BYOL for Large Instances

- SLES for SAP 12 SP2
- SLES for SAP 12 SP3

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# Support plans

## SUSE

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<tr>
<td>Software Upgrades &amp; Updates</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Technical Support</td>
<td>Unlimited</td>
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<tr>
<td>Methods of Access</td>
<td>Chat, Phone, Web</td>
<td>Chat, Phone, Web</td>
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<tr>
<td>Hours of Access</td>
<td>12x5</td>
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<tr>
<td>Response Time</td>
<td>2 hrs Severity 1, 4 hrs Severity 2, Next Business Day Severity 3, Next Business Day Severity 4</td>
<td>1 hrs Severity 1, 2 hrs Severity 2, 4 hrs Severity 3, Next Business Day Severity 4</td>
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## Microsoft for SAP

- Premier
- Azure Rapid Response (ARR)
Let’s bake “the” image…
Ingredients of a perfect OS Image?

Drivers

Packages

Kernel

Tuning

Optimize

Testing
Sources of the RIGHT Inputs

- OSS notes
- Install guides

SAP
- Config guides
- Tuning guides

SUSE

Microsoft
- IaaS Platform

Hardware Vendors
- Drivers
Key Packages

yast2-sap-ha  tune  saptune  util-linux uuidd util-linux-systemd libuuuid1
gtk2  java-ibm libicu ntp sudo tcsh libssh expect autoyer2-installation
bing bonnie cairo graphviz krb5- lient nfs-client sensors xfsprogs libnuma1
libgcc_s1  libstdc++6 multipath-tools libaio libopenssl  glibc  cyrus-sasl krb5
libcom_err2 libevent libldap libltdl7  pam  zlib  HANA-Firewall
yast2-hana-firewall  saprouter-systemd  cryptctl  clamav  clamsap
perl-TimeDate ha_sles  SAPHanaSR
Tune it for your taste…
Top Configurations

1. Configure C-States for lower latency in Linux (applies to Intel-based systems only)
2. Turn off the autoNUMA balancing
3. Disable Transparent Huge Pages (THP)
4. Energy Performance Bias EPB (applies to Intel-based systems only)
5. MTU setting
6. NTP is enabled
7. SMT is setup
8. Disable the EDAC kernel module
9. SAPTune is configured
Power Management

- **C States (Operating States)**
  - To control the power
  - C0 (Fully turned on) to C3 States
  - Set to light sleep (C1)

- **P States (Performance States)**
  - To operate at any P-state, the processor must be in the C0 state
  - C-states and P-states can vary independently of one another

- **T States (Throttling States)**
  - To throttling the processor clock to lower frequencies
Automatic Non-Uniform Memory Access (NUMA) Balancing

- HANA is NUMA aware
- Does not rely on Linux Kernel for NUMA
- Disable the NUMA
- Scale out configuration: Do it on each nodes (Requires reboot)
Disable Transparent Huge Pages

- THP allows the handling of multiple pages as hugepages to reduce the translation lookaside buffer (TLB) footprint
- Due to the special manner of HANA's memory management, the usage of THP may lead to hanging situations and degradations
- Disable the THP usage
Energy Performance Bias

- Set EPB in the BIOS to "Maximum performance"
MTU

- Set MTU = 1500 for client interface (HLI)
- Set MTU = 9000 for rest interfaces (HLI)
NTP

- Enable NTP for time synchronization
- You get short dump ZDATE_LARGE_TIME_DIFF
SMT Setup

- Central patch management
- Patch to latest
- Keep all the systems on same patch level
Disable EDAC

- Disable the EDAC at OS level
- Hardware vendor modules detects it
SAPTune

- Previously known as sapconf
- Pre configured tunings
- Review and adjust/override the settings as necessary
Make it highly available…
Cost Effective High Availability Scenario

An HLI HA/HSR setup
How to setup High Availability?

1. Build the infrastructure like VM/HLI, Network, Storage
   • You need two machines for HSR setup
2. Install the OS (with Azure you get pre-installed OS)
3. Create a pacemaker cluster
   • You need HA extension installed
4. Install SAP HANA
5. Setup the HANA System Replication (HSR)
6. Create HANA Cluster resource
7. Test the failover/failback
Wrap up…
Key Considerations

- Read the SAP, SUSE, and Microsoft documentation
- Get the OS subscription
- Review the support offerings
- Consider EOS from SUSE
Lessons learned

- Review the support plan from SUSE
- For HLI, EDAC should be disabled at the OS level
- Hyperthreading disable for >16 sockets
- MTU for client and HSR DR: 1500
- Review the drivers from hardware vendors
- Install the patches after the initial system provisioning
More Information

- SAP On Azure
- HLI Overview
- Supported Scenarios
- High availability and disaster recovery
- SAP Certified IaaS Platform
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