How Accenture Helps Its Customers Virtualize SAP Workloads with VMware

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Disclaimer

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• Features are subject to change, and must not be included in contracts, purchase orders, or sales agreements of any kind.
• Technical feasibility and market demand will affect final delivery.
• Pricing and packaging for any new technologies or features discussed or presented have not been determined.
## Agenda

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Customer motivation to migrate from Power / RISC SAP environment to a virtualized x86 infrastructure to run SAP HANA</td>
</tr>
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<td>SAP HANA Requirements and Transformations Steps</td>
</tr>
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</table>
Customer Motivation
Achieving higher flexibility by adding more automation
Customers currently see major challenges in legacy environments

Current SAP challenges

- **High Investments**
  SAP landscapes require a significant investment for hardware, storage and licenses. This leads to high CAPEX.

- **Fixed Payments**
  SAP infrastructure is usually billed and paid on basis of a fixed duration (per annum etc). More flexible payment models are not possible.

- **Long Lead Time**
  Provisioning of new SAP systems requires a significant amount of time, where business is not able to use a system and needs temporary systems.

- **Time consuming**
  Provisioning of new SAP environments requires long interaction with support and very detailed discussions on requirements.

- **Less Automation**
  Traditional SAP infrastructure offer less automation and many manual processes. This results in high operational expenses.

Solutions with virtualization on x86

- **Low Investments**
  Running virtualized SAP less upfront investment for commodity hardware and hence lower CAPEX.

- **Flexible Payments**
  Business users are very demanding and require flexibility when it comes to running systems. Flexible billing and payment can be implemented within virtualized environments.

- **Quick Processes**
  New SAP systems for testing can be provisioned on demand within some hours maximum. Users can order by themselves.

- **Quick Actions**
  Only some t-shirt sizes are available and must be used for provisioning SAP systems. Highly standardized services for running SAP.

- **Highly automated**
  SAP clouds come with a high degree of automation for standard tasks. No manual interactions would be necessary.
Customers aim to achieve three major goals

**Current SAP challenges**

**Less Automation**
Traditional SAP infrastructure offer less automation and many manual processes. This results in high operational expenses.

**High costs due to High Availability**
Production systems often require higher availability resulting in significant licensing costs and additional costs for sparse hardware (e.g. Veritas).

**High costs due to Disaster Recovery**
Production systems often require disaster recovery capability. This results in additional costs for sparse capacity in the DR datacenter and DR solution.

**Solutions with virtualization on x86**

**Highly automated**
SAP clouds come with a high degree of automation for standard tasks. No manual interactions would be necessary.

**Built-In High Availability**
Virtualized environments offer solutions for higher availability out of the box resulting in less maintenance work for the customer.

**Built-In Disaster Recovery**
Virtualized environments offer solutions for disaster recovery out of the box resulting in less maintenance work for the customer.

**Major Goals**

**Goal 1**
Reduce total cost of ownership by avoiding high upfront CAPEX

**Goal 2**
Achieve operational maturity for SAP

**Goal 3**
Future proof SAP operations
There are more potential benefits than pure cost savings

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Benefits</th>
<th>Business value</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>On demand infrastructure</td>
<td>No vendor lock-in</td>
<td>Run as a Service</td>
<td>Focus</td>
</tr>
<tr>
<td>Scalability: up and down</td>
<td></td>
<td></td>
<td>Guaranteed two speed IT</td>
</tr>
<tr>
<td>Immediate cost reductions</td>
<td>Full agility</td>
<td></td>
<td>Innovation (AI, ML, IoT, Hadoop)</td>
</tr>
</tbody>
</table>

The Core Business will benefit from a transformation to cloud because of the new agility, the enormous scalability and higher speed of innovations.
VMware is one of the major key players for the **Accenture Cloud Platform (ACP)**

### KEY ACP FEATURES

- Backup and recovery management
- Availability monitoring management
- Application monitoring management
- OS patching
- Antivirus management
- OS administration and OS hardening
- Workflow management and policy controls
- Multiple cloud integration options
- Multi-cloud management and consolidated dashboard
- Unified billing and analytics
- Environment blueprints and application templates
- Development and ERP services
- Enhanced security and controls
- Self-service catalogue and automated provisioning

- Single point of contact for all ACP cloud support requests, issues, and problem management
- Help center
- Provider management with pre-contracted, pre-integrated and public cloud providers
SAP HANA Requirements and Transformations Steps

Transformation needs to be planned properly.
Moving to SAP HANA is one of the key drivers for the IT transformation

Business Need
Business Owners identify key functionalities, which are provided by SAP HANA

IT response
Implementing SAP HANA does not provide any benefit to IT department, but adds complexity

Implementation Plan
Before implementation, customers need to think about new deployments, new infrastructure, new processes, new skills, new organization

Momentum
IT departments understand SAP HANA implementations as a momentum to get more things implemented

Drive Automation & Robotics
Once a transformation was started, automation and robotics are important to significantly lower the manual activities and the overall effort for the IT department
Once a transformation is started, various topics are being considered

**Infrastructure**
- Target Infrastructure
- Appliance / HANA TDI
- Overall Sizing
- New hardware platform
- Storage platform
- Storage sizing
- Tooling
- Portals

**Team**
- Identify skill gaps
- Formulate training plans
- Build SAP HANA CoE

**Processes**
- Identify new processes based on new hardware
- Technical and functional processes to be revised
- Collate processes and align with CoE approach

**Skills**
- SAP HANA Skills
- Skills for new target hardware platform / OS
- Skills for new storage systems
- Extend functional-technical skills
A new SAP HANA landscape is based on a reliable architecture and aiming for stable operations

<table>
<thead>
<tr>
<th>Overall Architecture</th>
<th>Transformation</th>
<th>Transition</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Create <strong>overall sizing and architecture</strong> (hardware, software, tools, services → complete)</td>
<td>• Support by defining <strong>infrastructure support during transformations</strong> (new platform)</td>
<td>• Support overall transition of <strong>highly critical and crucial SAP services</strong></td>
<td>• Support by shaping target operating models plus <strong>for new SAP HANA CoE / HANA operations</strong></td>
</tr>
<tr>
<td>• Include <strong>various hardware/software options for running SAP on HANA</strong></td>
<td>• Support by defining <strong>migration scope, estimations and approach</strong> (plus PoC)</td>
<td>• Support the definition of overall <strong>Knowledge Transfer</strong> scope</td>
<td>• Temporarily support and <strong>run virtualized SAP HANA infrastructure</strong></td>
</tr>
</tbody>
</table>

**Create SAP platforms on virtualization**

**Introduce SAP landscapes**

**Harmonize, stabilize and operate**
VMware Solutions for SAP HANA
Overview and Support Status
“We believe virtualized SAP HANA with VMware vSphere could be the key to our future, as we move to cut operational costs and simplify our data center operations”

Reinhard Breyer
CIO, AMG-Mercedes
Software-Defined Approach Unlocks the Complete Value of SAP

Hardware-Defined Data Center

Manual Operations

Constrained, Manual, Expensive and Proprietary

Software Layer

Software-Defined Data Center

Automated Operations

Robust, Scalable, High Performance and Programmable

Hardware

Intelligence

Hardware

Intelligence
## VMware for SAP Applications Overview

**From SAP Client over the Datacenter to the Cloud!**

### vSphere - SAP Classic and HANA Fully Supported

- Common virtualized architecture for entire SAP stack supported in production with VMware vSphere.
- Only Hypervisor with full SAP production support for SAP HANA, Windows or Linux OS based SAP applications and databases, on- and off-premise.
- HANA Scale-Up and Out support, single SAP HANA VM sizes up to 4 TB VM, 6 TB in validation.
- Integrated with SAP global support network.
- Virtualization costs as little as 10% from native, by better utilizing hardware resources and higher SLAs!

### vSAN / HCI – Ready for any SAP Application

- Hyper-converged leader with 9,000+ Virtual SAN Customers
- Up to 200k IOPS per host in all-flash (NVMe), over 12M IOPS on 12 nodes, up to 12 petabytes per cluster
- 6% virtualized availability with reference: oracle data services
- Storage policies instead of fixed storage configurations!
- SAP “Classic” and ANYDB no restrictions.
- SAP HANA Virtual SAN support as standalone or HCI configuration in planning.

### NSX – Network Virtualization Solution

- Enabling technology for SAP Hybrid Cloud Use cases
- Seamless encrypted migration, no data export or import needed (long distance vMotion)!
- Zero-Trust platform for SAP applications
- Network segmentation and firewalling with NSX simplifies SAP network and application zoning, security, and deployments.
- Complete Network Virtualization Platform, that leverages existing network components.

### vRA / vRO - SAP Automation, Live Cycle Management and Operations

- VMware vRA automation, for SAP IT services, allows you to improve IT service delivery while lowering costs.
- Policies enforce application deployment standards, resource quotas and service levels.
- VMware Adapter for SAP LAMA integrates SAP LAMA with VMware SDDC, enabling automated provisioning and live cycle management.
- Usage of vRealize Operations provides proactive identification and remediation of emerging performance, capacity, and configuration issues.
- One single console for SAP applications and infrastructure.
SAP HANA Scale Up and Out on vSphere

Virtualized SAP HANA – Benefits and Status:

- Fully supported for productive Scale-up and Scale-Out Scenarios
- Right sizing – mixed HANA T-shirt sizes
- High ROI – higher utilization of server and storage hardware, purchase large server systems rather than multiple smaller server systems
- Fully isolated, secure, and encapsulated, no dependencies
- Consolidation with SAP HANA, SAP Applications or any other application possible!
- IT management and process standardization – operate SAP HANA just like any other business critical application
- Standard HA, no in-guest cluster or SAP HANA standby Autohost failover required.
- HANA System Replication supported for HANA VMs that demand a very short RTO.
- vSphere 5.5 – 4 TB per host, 1 TB per VM (VMware limit)
- vSphere 6.0 and 6.5 – 12 TB per host, 4 TB per VM, NUMA node sharing allowed, 6 TB VM RAM with vSphere 6.5 in validation

SAP HANA on vSphere Notes:

- 1995460 – SAP HANA on VMware vSphere 5.5 in production
- 2024433 – Multiple SAP HANA VMs on VMware vSphere 5.5 in production
- 2157587 – SAP BW, powered by SAP HANA on VMware vSphere 5.5 Scale-Out in production
- 2315348 – SAP HANA VM on VMware vSphere 6 in production
- 2393917 – SAP HANA VM on VMware vSphere 6.5 in production
- https://wiki.scn.sap.com/wiki/display/VIRTUALIZATION/SAP+HANA+on+VMware+vSphere
SAP on Power to virtualized x86 migration (sizing)
Migration of SAP Systems to SAP HANA

https://blogs.sap.com/2013/12/03/migration-of-sap-systems-to-sap-hana/

For the migration of ABAP-based SAP systems to SAP HANA, several migration path options are offered:

**Option 1: New installation**
- You install a new system on SAP HANA
- Either without changing existing solutions (greenfield)
- Or for transforming existing solution to SAP HANA by performing (selective) data migration

**Option 2: Classical migration**
- To bring the original system on release supported by SAP HANA, you perform update/upgrade (if required)
- Then, you classically migrate your traditional database to SAP HANA

**Option 3: One-step upgrade and migration with DMO of SUM**
- You use database migration option (DMO) of SUM that combines upgrade and database migration in one step
- One process, one tool, one documentation, one downtime
Virtual SAP HANA Sizing – just like Physical SAP HANA

Customer Interested in SAP S/4HANA

New SAP S/4HANA system (Greenfield Sizing)
Use HANA QuickSizer

Existing SAP system migrated to SAP S/4HANA (Migration Sizing)
Use Migration Reports

Find deployment options:
- Appliances, SAP Tailored Datacenter Integration (TDI), Cloud via SAP Cloud
- Appliance Library (CAL)

Connect with hardware vendor and check for sample configuration or get started with SAP CAL

© SAP, Pictures and process source: General SAP HANA sizing procedure with building blocks, sizing guide.
Virtual SAP HANA Sizing – just like Physical SAP HANA cont.

Only “one” major rule sizing:

- Respect VMware vSphere limits like 128 vCPU and 4 / 6 TB limit per VM and calculate with an 10% SAPS virtualization overhead buffer for CPU and reserve some memory for ESXi (8 GB min).

For HANA VMs use VMX parameter numa.vcpu.preferHT = TRUE to leverage Hyperthreads and to maintain memory locality!

Figure 2-6: General SAP HANA sizing procedure with building blocks

© SAP, Pictures and process source: General SAP HANA sizing procedure with building blocks, sizing guide, page 8
Example SAP IBM Power System Configuration – Existing Configuration

- Both systems are configured as 2-Tier (APP and DB run together), RAM and SAPS “capacity” of partition is therefore shared, CPU utilization factor applies for DB and app servers.

  - System 1: IBM Power System 770 (9117-MMD), 3.80 GHz POWER7+, 48cores
    - High Water Benchmark: **175,340** SAPS
    - “SID A” partition: 32 CPU Cores, 242 GB RAM, with around **88,000** SAPS, 2-Tier configuration (DB and APP run together)

  - System 2: IBM Power System 850 (8408-E8E), 3.02 GHz Power8, 48cores
    - High Water Benchmark: **188,540** SAPS
    - “SID B” partition: 6 CPU Cores, 72 GB RAM, with around **24,000** SAPS, 2-Tier configuration (DB and APP run together)

*High Water Benchmark results with SAP Business Suite ECC6, EHP5 on AIX and Oracle
Example: Performance Indicators for “SID A” (early watch report)

The following table shows the relevant performance indicators in various system areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>Indicators</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Performance</td>
<td>Active Users (&gt;400 steps)</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Avg. Availability per Week</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time in Dialog Task</td>
<td>1841 ms</td>
</tr>
<tr>
<td></td>
<td>Max. Dialog Steps per Hour</td>
<td>322</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time at Peak Dialog Hour</td>
<td>2686 ms</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time in RFC Task</td>
<td>2083 ms</td>
</tr>
<tr>
<td></td>
<td>Max. Number of RFCs per Hour</td>
<td>18157</td>
</tr>
<tr>
<td></td>
<td>Avg. RFC Response Time at Peak Hour</td>
<td>922 ms</td>
</tr>
<tr>
<td>Hardware Capacity</td>
<td>Max. CPU Utilization on DB Server</td>
<td>37%</td>
</tr>
<tr>
<td>Database Performance</td>
<td>Avg. DB Request Time in Dialog Task</td>
<td>283 ms</td>
</tr>
<tr>
<td></td>
<td>Avg. DB Request Time for RFC</td>
<td>834 ms</td>
</tr>
<tr>
<td></td>
<td>Avg. DB Request Time in Update Task</td>
<td>85 ms</td>
</tr>
<tr>
<td>Database Space Management</td>
<td>DB Size</td>
<td>4780.87 GB</td>
</tr>
<tr>
<td></td>
<td>DB Growth Last Month</td>
<td>121.20 GB</td>
</tr>
</tbody>
</table>
Example: SAP ABAP Sizing Reports provide RAM need for “SID A” (BW System)

<table>
<thead>
<tr>
<th>MEMORY REQUIREMENT (Minimum Total: 1746 GB)</th>
<th>PHYS. MEMORY PER NODE: 512 GB</th>
<th>PHYS. MEMORY PER NODE: 372 GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM in GB</td>
<td>1746 GB</td>
<td>1374 GB</td>
</tr>
<tr>
<td>Physical Memory / Node</td>
<td>512 GB</td>
<td>372 GB</td>
</tr>
<tr>
<td>Physical Memory / Node (Min Total: 1374 GB)</td>
<td>1374 GB</td>
<td>1374 GB</td>
</tr>
<tr>
<td>Physical Memory / Node (Max Total: 1746 GB)</td>
<td>1746 GB</td>
<td>1746 GB</td>
</tr>
</tbody>
</table>

**DISK SPACE REQUIREMENT**

- **Memory Requirement**
  - Data: Minimum Total: 1746 GB
  - Log: Minimum Total: 156 GB

**SYSTEM INFORMATION**

- **Report version**: 2.2.1
- **Execution date and time**: 28.02.2017 11:31:34
- **Runtime**: 00:04:15
- **Parallel degree**: 1

**DISK SPACE REQUIREMENT**

- Data: Minimum Total: 1374 GB
- Log: Minimum Total: 133 GB

**TABLE (All Servers)**

- SID A

**SYSTEM INFORMATION**

- **Report version**: 2.2.1
- **Execution date and time**: 28.02.2017 11:31:34
- **Runtime**: 00:04:15
- **Parallel degree**: 1
Virtualized SAP HANA Target Configuration
# Virtual SID A configuration based on following assumptions

<table>
<thead>
<tr>
<th>SID A - Power 7 system estimated SAPS</th>
<th>Total CPUs</th>
<th>virtual CPUs</th>
<th>SAPS assumption</th>
<th>VM Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Database Server Tier:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BW DB SAPS Capacity</td>
<td>128</td>
<td>32</td>
<td>88000</td>
<td></td>
</tr>
<tr>
<td>Peak CPU Utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required SAPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required SAPS for SAP HANA (5 x AnyDB for BW)</td>
<td>37%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required E7-v4 22 CPU sockets for HANA DB</td>
<td>16280</td>
<td>8100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HANA System/VM RAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Application Server Tier:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBR App Server(s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak CPU Utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required SAPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required SAPS for APP Servers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required SAPS for App Server VM (2 suggested)</td>
<td>16280</td>
<td>8100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required E7-v4 22 CPUs/Core CPUs for App Server VM</td>
<td>3,837 calculated Cores</td>
<td>3,837 calculated Cores</td>
<td>120 GB RAM with 5 pCores, 10 vCPU</td>
<td>240 GB RAM</td>
</tr>
<tr>
<td>optional 2nd VM for HA / App Server logon Group</td>
<td>0,1743997644</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>App Server RAM 32 GB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Target server:** 8 CPU socket with 4 TB -> 512 GB per socket
HANA RAM: 3072 GB / 512 GB = 6 CPU Sockets
Virtual SID B configuration based on following assumptions

<table>
<thead>
<tr>
<th>VM Configuration</th>
<th>Total CPUs</th>
<th>virtual CPUs</th>
<th>SAPS assumption</th>
<th>VM Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMC Power 8 overall SAPS</td>
<td>24</td>
<td>6</td>
<td>24000</td>
<td></td>
</tr>
</tbody>
</table>

**Database Server Tier:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OLTP DB SAPS Capacity</td>
<td>OLTP DB 30% App 70%</td>
</tr>
<tr>
<td>Peak CPU Utilization</td>
<td>59%</td>
</tr>
<tr>
<td>Required SAPS</td>
<td>4248</td>
</tr>
<tr>
<td>Required SAPS for SAP HANA (3 x AnyDB for Suite)</td>
<td>12744</td>
</tr>
<tr>
<td>Required E7-v4 22 CPUs/Core CPUs for HANA DB</td>
<td>0,273040614</td>
</tr>
<tr>
<td>HANA System/VM RAM</td>
<td>364 GB</td>
</tr>
</tbody>
</table>

**Application Server Tier:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMC App Server(s)</td>
<td>OLTP DB 30% App 70%</td>
</tr>
<tr>
<td>Peak CPU Utilization</td>
<td>59%</td>
</tr>
<tr>
<td>Required SAPS</td>
<td>9912</td>
</tr>
<tr>
<td>Required SAPS for APP Servers</td>
<td>9912</td>
</tr>
<tr>
<td>Required SAPS for App Server VM (2 suggested)</td>
<td>4956</td>
</tr>
<tr>
<td>Required E7-v4 22 CPUs/Core CPUs for App Server VM</td>
<td>0,106182461</td>
</tr>
<tr>
<td>App Server RAM 32 GB</td>
<td>16 GB</td>
</tr>
</tbody>
</table>

1 NUMA Node with 512 GB RAM and 22 pCores / 44 vCPUs
120 GB RAM with 5 pCores, 10 vCPU
120 GB RAM with 5 pCores, 10 vCPU
240 GB RAM
VMware vSphere SAP “SID A” and “SID B” Setup (including HA)

- All VMs get the RAM they need, virtual SAPS performance is more than enough (>50,000 SAPS per CPU socket)
- All VMs are VMware HA protected.
- Standard HA for all Apps including SAP HANA, with:
  - RPO = 0
  - RTO = time to load SAP HANA database tables into RAM
  - No DR!
  - Cost efficient
  - Easy operation

Note: 8 Socket Broadwell vSphere 6.5 certification is planned for early September 2017. 8 socket Broadwell system is currently in validation!
Platform Migration Outcome

- Replacement of the customer IBM Power systems with in total around 365,000 SAPS and 3 TB RAM, with two SAP HANA Intel x86 based Broadwell 8 socket servers, with over 800,000 SAPS and 8 TB of RAM provides over 2x time more performance (security buffer) to run the new SAP HANA database and SAP application stack.

- 99.9+ percent uptime of VMware HA protected SAP and HANA DB systems.

- Application servers and SAP HANA databases VMs run on the same hosts to optimize network latencies.

- “1/2 the system power” compared to IBM POWER8*-based solutions’ claim based on estimated system power of 8-socket server using Intel® Xeon® processor E7-8890 v4, 2,496 watts max power, versus an 8-socket IBM Power E870, 5,068 watts max power, source Intel®.

- “Up to 10X better performance per dollar” compared to IBM POWER8*-based solutions’ claims based on estimated SPECint* rate(base2006) performance of 8-socket server using Intel® Xeon® processor E7-8890 v4 scoring 6900 priced at an Intel estimated list price of $165,000 to 8-socket IBM Power E870 scoring 4830 priced at public list price of $1,592,788, source Intel®.

Private Cloud implementations on premise are still very famous and many customers build the landscapes based on VMware.

Accenture uses VMware to run large customer landscapes.

Business requires agility and speed – automation and robotics are the answers to this and can be achieved by leveraging VMware.

The commodity x86 hardware is the way to go for SAP HANA implementations to lower TCO and should always go hand-in-hand with VMware.
# What Accenture can do for your business?

## Accenture Operations

Accenture helps IT and business leaders design, transform and run the intelligent infrastructure that enables the digital business. Our end-to-end infrastructure services help clients harness the power of emerging technologies while getting the most out of their legacy environments. By standardizing, consolidating, automating and integrating their infrastructures across on premise and cloud environments, we help customers lay the foundation for an agile, secure digital business.

### Managed Services

<table>
<thead>
<tr>
<th>Description</th>
<th>Number Managed</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC: OS Instances</td>
<td>127,000+</td>
</tr>
<tr>
<td>DC: Database Instances</td>
<td>28,750</td>
</tr>
<tr>
<td>DC: Physical servers</td>
<td>121,240</td>
</tr>
<tr>
<td>DC: Virtual servers</td>
<td>159,460</td>
</tr>
<tr>
<td>DC: PB of enterprise server storage</td>
<td>143</td>
</tr>
<tr>
<td>Network: Total Ports</td>
<td>2,200,000</td>
</tr>
<tr>
<td>Network: Voice Devices</td>
<td>214,000</td>
</tr>
<tr>
<td>Workplace: # of seats</td>
<td>395,250</td>
</tr>
<tr>
<td>Service desk: Supported Users</td>
<td>1,384,650</td>
</tr>
<tr>
<td>Service desk: # of contacts per annum</td>
<td>10 million</td>
</tr>
<tr>
<td>Cross-Functional: Configuration Items</td>
<td>3,611,150</td>
</tr>
<tr>
<td>Security: Firewalls</td>
<td>24,000+</td>
</tr>
</tbody>
</table>

### Global Footprint

Accenture has a global delivery network of 35 delivery centers across the globe:

- Bangalore: Lodz: Recife
- Bratislava: Madrid: Salt Lake City
- Bucharest: Mauritius: San Antonio
- Buenos Aires: Manila: Sao Paulo
- Cincinnati: Milan: Seville
- Dalian: Minneapolis: Seville
- Delhi: Naples: Sydney
- Dublin: Ottawa: Warsaw
- Hof: Paris: Warwick
- Kolkata: Prague: Warwick
- Kronberg: Pune: Warwick
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Thank You

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