SAP HANA on IBM POWER8
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IBM Nordic
POWER BUE
Appliance vs. TDI for SAP HANA

**Appliance**

**Tailored Datacenter Infrastructure**
What is important for SAP HANA?

- HANA is a memory based application – **memory is important**.
- Simplicity – *Have the BW on one server is important*.
- SAP HANA is business critical applications – **business continuity is important**.
- SAP HANA grows and (sometimes) with unpredicted speed – *scalability is important*
- Occasionally infrastructure software is paid by the number of CPU cores - *the CPU core to memory ratio is important*

**SAP HANA is the most demanding application we have ever seen.....**

*William Starke, Distinguished Engineer, POWER Microprocessor Development*
Already SAP on POWER8? – get **started** with HANA

POWER technology brings flexibility.........

<table>
<thead>
<tr>
<th>Oracle DB Prod #1</th>
<th>SAP Business Suite Prod #2</th>
<th>SAP Business Suite Prod #3</th>
<th>SAP B. Suite Prod #4</th>
<th>SAP HANA Non-prod</th>
<th>Capacity On Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,0 TB Memory</td>
<td>2,0 TB Memory</td>
<td>2,0 TB Memory</td>
<td>1,0 TB Memory</td>
<td>1,0 TB Memory</td>
<td>2,0 TB Memory</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LPAR #1, #2, #3, #4, #5, #6</th>
<th>Non-activated Ressources</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPAR #1, #2, #3, #4, #5, #6</td>
<td>V I O #1</td>
</tr>
<tr>
<td>V I O #2</td>
<td></td>
</tr>
</tbody>
</table>

**One POWER8 Server**

- **Use POWER8 capacity to run test with HANA**
- Get started with existing infrastructure.
- Take advantage of previous investments.
- Test on already known technology.

**Example with:**
- 11,0 TB installed
- 9,0 TB activated
- 2,0 TB ”on demand”
Scale up with POWER8.

POWER8 brings **dynamic LPARS** and **COD** to SAP HANA

<table>
<thead>
<tr>
<th></th>
<th>SAP HANA</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Prod #1</td>
<td>2,0 TB</td>
<td>2,0 TB</td>
<td>2,0 TB</td>
<td>1,0 TB</td>
<td>1,0 TB</td>
<td>1,0 TB</td>
</tr>
<tr>
<td>Memory</td>
<td>Memory</td>
<td>Memory</td>
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<td>Memory</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>LPAR #1</th>
<th>Dedicated Res.</th>
<th>LPAR #2</th>
<th>Dedicated Res.</th>
<th>LPAR #3</th>
<th>Dedicated Res.</th>
<th>LPAR #4, #5, #6</th>
<th>Shared Processor Pool</th>
<th>Non-activated Ressources</th>
</tr>
</thead>
<tbody>
<tr>
<td>V I O #1</td>
<td></td>
<td>V I O #2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**One POWER8 Server**

- **Three production LPARS for HANA**
- DLPAR = Dynamic LPAR. Changes in ressources requires a restart of HANA
- **Non-prod.** Shared Processor Pool. No restart and "endless" # LPARs.....

**Example with:**
- 11,0 TB installed
- 9,0 TB activated
- 2,0 TB ”on demand”
## Sizing of HANA on POWER

<table>
<thead>
<tr>
<th>Power8 model</th>
<th>LPAR architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>S822L</td>
<td><strong>Two dedicated</strong> pools for production. <strong>One shared</strong> pool for non-production.</td>
</tr>
<tr>
<td>S824L</td>
<td><strong>Two dedicated</strong> pools for production. <strong>One shared</strong> pool for non-production.</td>
</tr>
<tr>
<td>E850C</td>
<td><strong>Five dedicated</strong> pools for production. <strong>One shared</strong> pool for non-production.</td>
</tr>
<tr>
<td>E870C</td>
<td><strong>Seven dedicated</strong> pools for production. <strong>One shared</strong> pool for non-production.</td>
</tr>
<tr>
<td>E880C</td>
<td><strong>Seven dedicated</strong> pools for production. <strong>One shared</strong> pool for non-production.</td>
</tr>
</tbody>
</table>

NB: You can add one LPAR if POWER server is used without shared pool

<table>
<thead>
<tr>
<th>Power8 model</th>
<th>Max. cores per LPAR</th>
<th>Max. memory per LPAR</th>
<th>One core to memory ratio BW</th>
<th>Max. memory per LPAR S/4 HANA</th>
<th>One core to memory ratio S/4 HANA</th>
</tr>
</thead>
<tbody>
<tr>
<td>S822L</td>
<td>24</td>
<td>768 GB</td>
<td>32 GB</td>
<td>1.024 GB</td>
<td>42 GB</td>
</tr>
<tr>
<td>S824L</td>
<td>24</td>
<td>768 GB</td>
<td>32 GB</td>
<td>2.048 GB</td>
<td>85 GB</td>
</tr>
<tr>
<td>E850C</td>
<td>48</td>
<td>1.536 GB</td>
<td>32 GB</td>
<td>4.096 GB</td>
<td>85 GB</td>
</tr>
<tr>
<td>E870C</td>
<td>80</td>
<td>4.000 GB</td>
<td>50 GB</td>
<td>7.680 GB</td>
<td>96 GB</td>
</tr>
<tr>
<td>E880C</td>
<td>96</td>
<td>4.800 GB</td>
<td>50 GB</td>
<td>9.216 GB</td>
<td>96 GB</td>
</tr>
</tbody>
</table>
Performance

Power8 is designed for data movement:

<table>
<thead>
<tr>
<th>Chip Family</th>
<th>Core Frequency (GHz)</th>
<th>L1 plus L2 Cache per Core (KB)</th>
<th>Approximate Cache per Core (MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel 26xx-V4 (2S, 8+ Cores)</td>
<td>1.7 – 3.2</td>
<td>320</td>
<td>2.81 – 3.44</td>
</tr>
<tr>
<td>Intel 46xx-V4 (4S, 8+ Cores)</td>
<td>1.8 – 2.6</td>
<td>320</td>
<td>2.81 – 4.06</td>
</tr>
<tr>
<td>Intel 48xx-V4 (4S, 8+ Cores)</td>
<td>2.0 – 2.1</td>
<td>320</td>
<td>2.81</td>
</tr>
<tr>
<td>Intel 88xx-V4 (8S, 8+ Cores)</td>
<td>2.1 – 2.8</td>
<td>320</td>
<td>2.81 – 6.31</td>
</tr>
<tr>
<td>POWER8 (DCM, 8+ Cores)</td>
<td>3.02 – 4.15</td>
<td>608</td>
<td><strong>19.27</strong></td>
</tr>
<tr>
<td>IBM z13</td>
<td>5.0</td>
<td>4,320</td>
<td>32.22</td>
</tr>
</tbody>
</table>

*2S=2 Socket, 4S=4 Socket, 8S=8 Socket, DCM=Dual Chip Module, SCM=Single Chip Module, Low Power Models Not Included, Updated 6/1/2015*
SAP High-level infrastructure architecture: Intel/x86

Site: A

- Nine servers for Production.
- One server for multitenancy:
  - Training
  - QA
  - Development
  - Sandbox

Site: B

- Nine servers for DR Production & PreProd.
- x86 server are configured with:
  - 72 cores
  - 1.5 TB memory

Real Example with 12 TB DB

Total of 720 cores installed
Total of 648 cores installed
SAP High-level infrastructure architecture: IBM POWER8

Site: A

One server with:
- Production
- Training
- QA
- Development
- Sandbox

Power E880
16 TB memory installed
192 cores installed

Site: B

One server with Pre-production and replica of:
Production for DR purposes

Power E880
16 TB memory installed
192 cores installed

Replication

Real Example
<table>
<thead>
<tr>
<th>E880</th>
<th>Range of Min-Max cores allowed for E880</th>
<th>Cores used by similar competitors (No range allowed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 9TB</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>Above 9 TB and up to 10 TB</td>
<td>108</td>
<td>132</td>
</tr>
<tr>
<td>Above 10 TB and up to 11 TB</td>
<td>120</td>
<td>132</td>
</tr>
<tr>
<td>Above 11 TB and up to 12 TB</td>
<td>128 (96GB/c)</td>
<td>144</td>
</tr>
<tr>
<td>Above 12 TB and up to 13 TB</td>
<td>132</td>
<td>144</td>
</tr>
<tr>
<td>Above 13 TB and up to 14 TB</td>
<td>136</td>
<td>144</td>
</tr>
<tr>
<td>Above 14 TB and up to 15 TB</td>
<td>140</td>
<td>144</td>
</tr>
<tr>
<td>Above 15 TB and up to 16 TB</td>
<td>144 (114GB/c)</td>
<td>384 for HPE/Bull (SGI uses 480 for 20TB support)</td>
</tr>
</tbody>
</table>
Migrating from Intel to POWER

- **DB Size.** was reduced to 80% of the HANA on Intel db size.
- **Loading time.** The reference loading time was reduced with 44%
Report performance before/after going to POWER

A reduction of 26% - 67% in report execution of selected test reports
Client benefits

<table>
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<tr>
<th>Reduced time spent on housekeeping</th>
<th>• Scale Up instead of Scale Out has considerably reduced the need for housekeeping activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Further improved performance</td>
<td>• Users are getting reports even faster</td>
</tr>
<tr>
<td>Improved availability</td>
<td>• System Replication in combination with SLE HAE provides Data Center redundancy and fast failover</td>
</tr>
<tr>
<td>Increased scalability</td>
<td>• Maximum DB size 4.8TB</td>
</tr>
<tr>
<td>Decreased Data Center footprint</td>
<td>• Reduced number of servers</td>
</tr>
</tbody>
</table>
Achieved benefits: HANA on POWER instead on Intel:

- **Simplicity:** Have your SAP environment on very few servers and *avoid* the “n+1” architecture. Makes the infrastructure *simple and cost effective* (some swg costs are paid by # cores – this will be reduced).

- **Flexibility:** Have the possibility to *scale up and down* on logical servers *during* production ensures a *smooth SAP operation* which supports the business demands (and happy users).

- **On Demand:** Have CPU and memory installed and *not* paid for *reduces the investment* and ensures that new SAP servers can be installed *within minutes* (no physical HW installation or service windows are needed).

- **Fast SAP.** The POWER8 chip is *designed for SAP and SAP HANA* and benchmark proves an *extremely* fast execution.

- **Proven track record:** IBM POWER8 for SAP HANA has been on the market for more than a year. 200+ companies have decided to run on POWER8 *due to above mentioned advantages.*
Processor Technology Roadmap

Continued Investment in POWER

POWER8
22 nm

- 12 Cores
- SMT8
- 2X DPFP
- PCIe Gen 3
- Coprocessor (CAPI)
- Enhanced Prefetch

POWER8+
22 nm

- NVLINK1.0
- 2X CAPI

POWER9
14 nm

- 24 Cores
- New μArchitecture
- Direct-attach DDR4
- Gen4 PCIe
- CAPI 2.0
- NVLINK2.0

POWER10
10 nm

- 48 Cores
- New μArchitecture
- Enhanced Memory
- OpenCAPI
- NVLINK3

POWER11
7 nm

- >48 Cores
- New μArchitecture
- 2x SIMD width
- Future NVLINK
- Future OpenCAPI

2014
2016
2017
2019-2020
Future
SAP HANA on POWER: Recent Nordic Wins

- CHR HANSEN
- GRUNDFOS
- TURKU ÅBO
- tiera
- SWEDISH ARMED FORCES
- SCA Care of Life
- Atea Outsourcing Services (AOS)
- KOMPLETT.no
- LEMVIGH-MÜLLER
- The city of Akureyri
- ATEA
- petoro
Thank You!

ibm.com/smartersystems

Simply put, IBM is making systems smarter.