DB2 BLU for SAP

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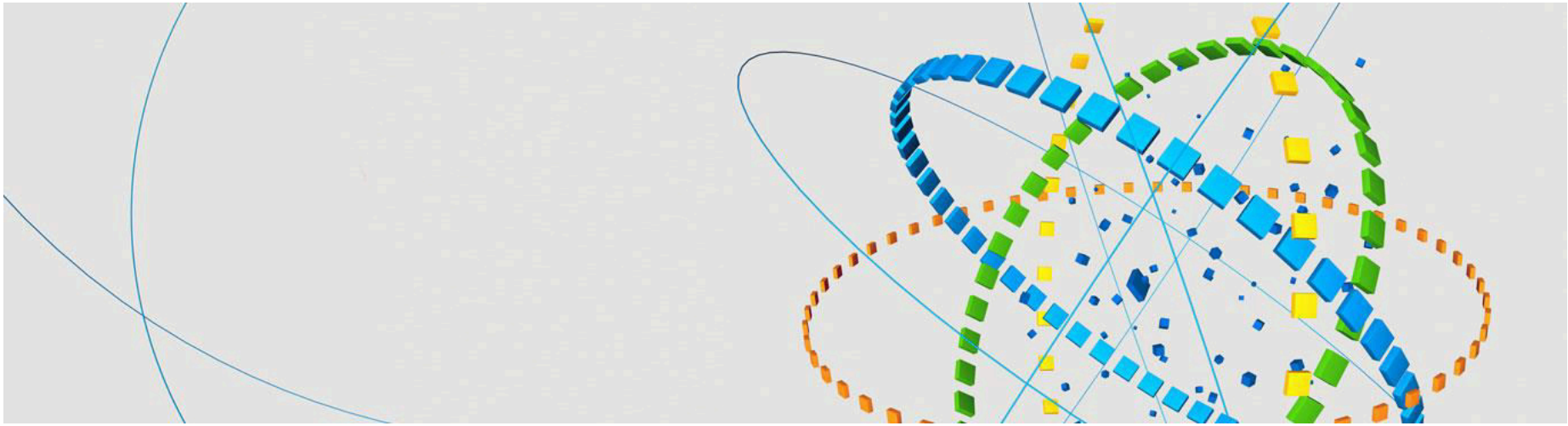


DB2 TCO benefit for SAP Customer

DB2 compared to any other SAP supported database

reduces annual OPEX costs

by > 20%

improves SAP performance

by > 30 %

TCO Reduction through DB2 for SAP - Savings Potential

Cost aspect	DB2 Benefit	Typical Savings Potential
SW-Cost	▪ Reduction of database-license and maintenance cost (compared to Oracle) through attractive DB2 prices ▪No cost for additional database management tools based on comprehensive DB2 product bundle	~ 25 - 40% (Maintenance 60%)
Storage	▪ Reduction of storage cost through DB2 compression -Smaller database size -Less I/Os -Smaller backup volume and faster backups	~ 40 -80%
Server	▪ Reduction of server cost through better performance and scalability -Efficient use of RAM due to compressed data in DB2 buffers	~10 -15% at database server
Operation / Administration	-Simplified administration, better patch/release-planning -Better 24x7 HA&DR solution easier achievement of SLAs	
TCO	▪**Sum of all DB2 benefits**	**~ 20-40%**

Extract of SAP customers who migrated to DB2

OPEX Cost Comparison: German Utility Company 5200 SAP user

	Oracle 10	IBM DB2 V10	ORACLE V11 (incl. Advanced Compression)
IT Service	**2,7 MIO EUR**	**2,6 MIO EUR**	**2,7 MIO EUR**
Storage	**1,4 MIO EUR**	**0,3 MIO EUR**	**1,0 MIO EUR**
Release upgrade DB(*)	**0,1 MIO EUR**		**0,1 MIO EUR**
Total per year	**4,2 MIO EUR**	**2,9 MIO EUR**	**3,8 MIO EUR**
Reduction per year		**30 %**	**9,5%**

(*) Oracle DB upgrade every 4 years, separate project, project cost apportioned by year.

- Operational Benefits

1st-year cost-avoidance Oracle licenses	**$250,000**
Database size reduction	**40%**
1st-year (additional) storage cost savings	**$100,000**
Annual license, storage, maintenance savings	**$175,000**
Database response time improvement	**5% to 10%**
ROI	**+205%**
ROI breakeven	**8 months**
5-year internal rate of return	**+133%**

SAP and DB2 – Strong Partnership

- **Deep Exploitation over a Decade of Joint Development**
  - All new database technologies will require time until they reach the same level of integration and maturity that DB2 has with SAP
  - DB2 has a history track of success with SAP
  - Deep Exploitation with DB2 and SAP
- **Partnership Continues**
  - SAP certified PureData System in November 2012
  - SAP DB2 10.5 certified in August 2013
  - SAP BLU Certification is on track for BW – target date this week
  - Joint development roadmap in place for 2015+
- **SAP Certification of BLU and BW**
  - Staged Delivery across BW capabilities
  - Stage 1 - Standard InfoCubes, Non-Cumulative InfoCubes, DB2 Near-Line Storage
  - Stage 2 – DSOs, Master Data, Flat InfoCubes, Transactional InfoCubes, InfoSets, Persistent Staging Area (PSA)

DB2-SAP: Strategic Technology Alignment and Support

Database version	Database GA	SAP DB GA	Delay between database and SAP GA (in months)	SAP DB support until
DB2 8.2	29th April 2005	3rd June 2005	1	31.12.2015*
DB2 9.1	28th July 2006	31st August 2006	1	31.12.2017*
DB2 9.5	31st October 2008	20th Dec 2008	2	31.12.2017*
DB2 9.7	26th June 2009	28th August 2009	2	31.12.2022*
DB2 10	***4th April 2012***	***July 2012***	***3***	***31.12.2022****
Oracle 9i	June 2001	Q1/2003	21	31.07.2008
Oracle 10g	January 2004	Q3/2006	31	31.07.2011
Oracle 11g	July 2007	Q2/2010	33	January 2015

* DB2 follows SAP's maintenance strategy 7+2,
Status: 2nd November 2011
Source: SAP Marketplace, SAP hint 1168456, SAP hint 1174136

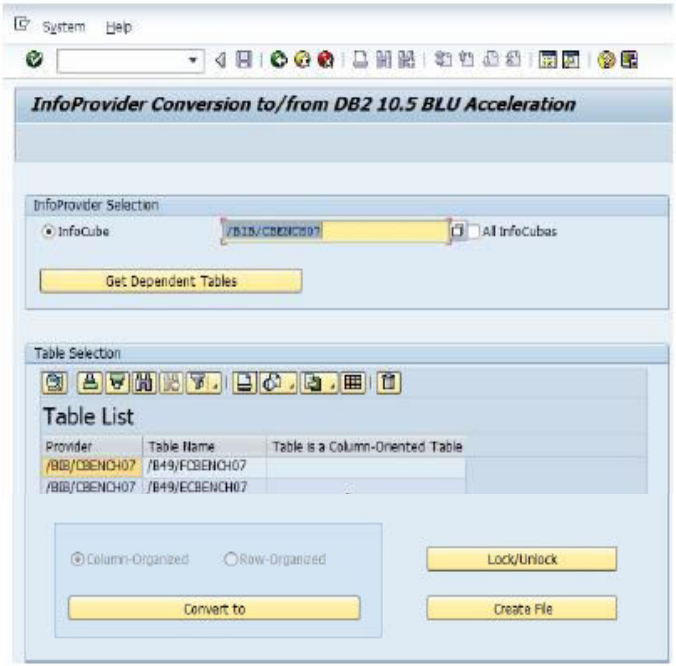
Joint DB2 & SAP development: Early tests during the implementation in Toronto + Walldorf

- DB2 between 1-2 months delay supported by SAP
- DB2 supports existing database version for a long time (DB2 8.2 support ends after Oracle 11.2g de-support)

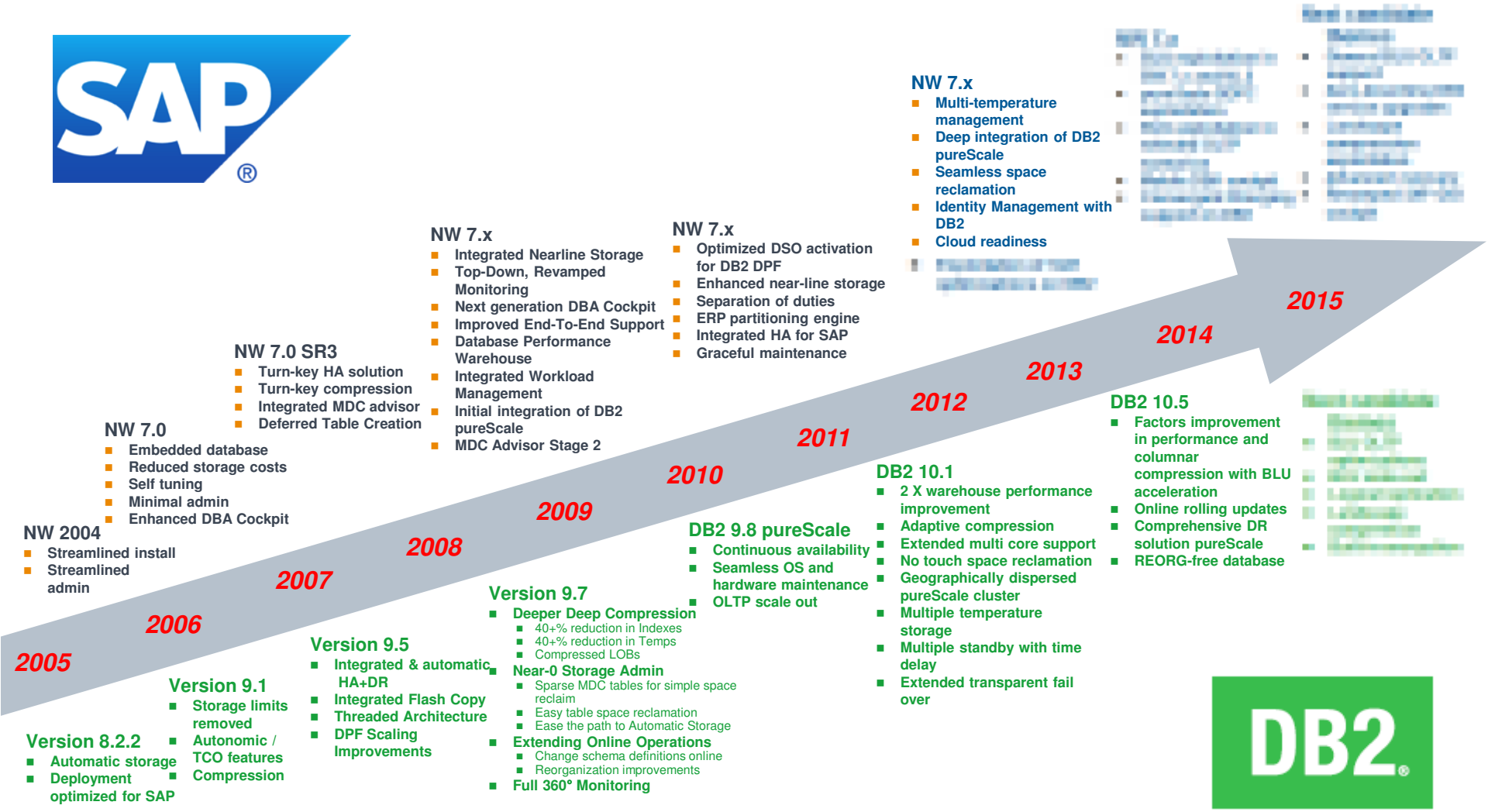
Relaxed long-term project planning combined with usage of most current DB2 technology

SAP BW: Information about BLU

- Support for SAP BW and NLS
  - SAP BW 7.00 and higher (expected Sep. 2013)
  - DB2 10.5 FP1 and higher
  - DB2 10.5 BLU extensions will be delivered with SAP BW support packages
  - First wave: standard & non-cumulative info-cube
  - Second wave: DSO and Master Data
- DB6CONV – SAP ABAP tool for Online/Offline table move
  - report SAP_CDE_CONVERSION_DB6
  - Calls DB2 Admin Move Table (AMT) to move
    - Non-BLU -> BLU online
    - BLU -> BLU / Non-BLU in read-only mode
- db6_update_db script
  - Enables WLM concurrency threshold
- SAP ABAP Dictionary extension to support BLU tables as new table type
- DBA Cockpit
  - Support new performance metrics for BLU tables



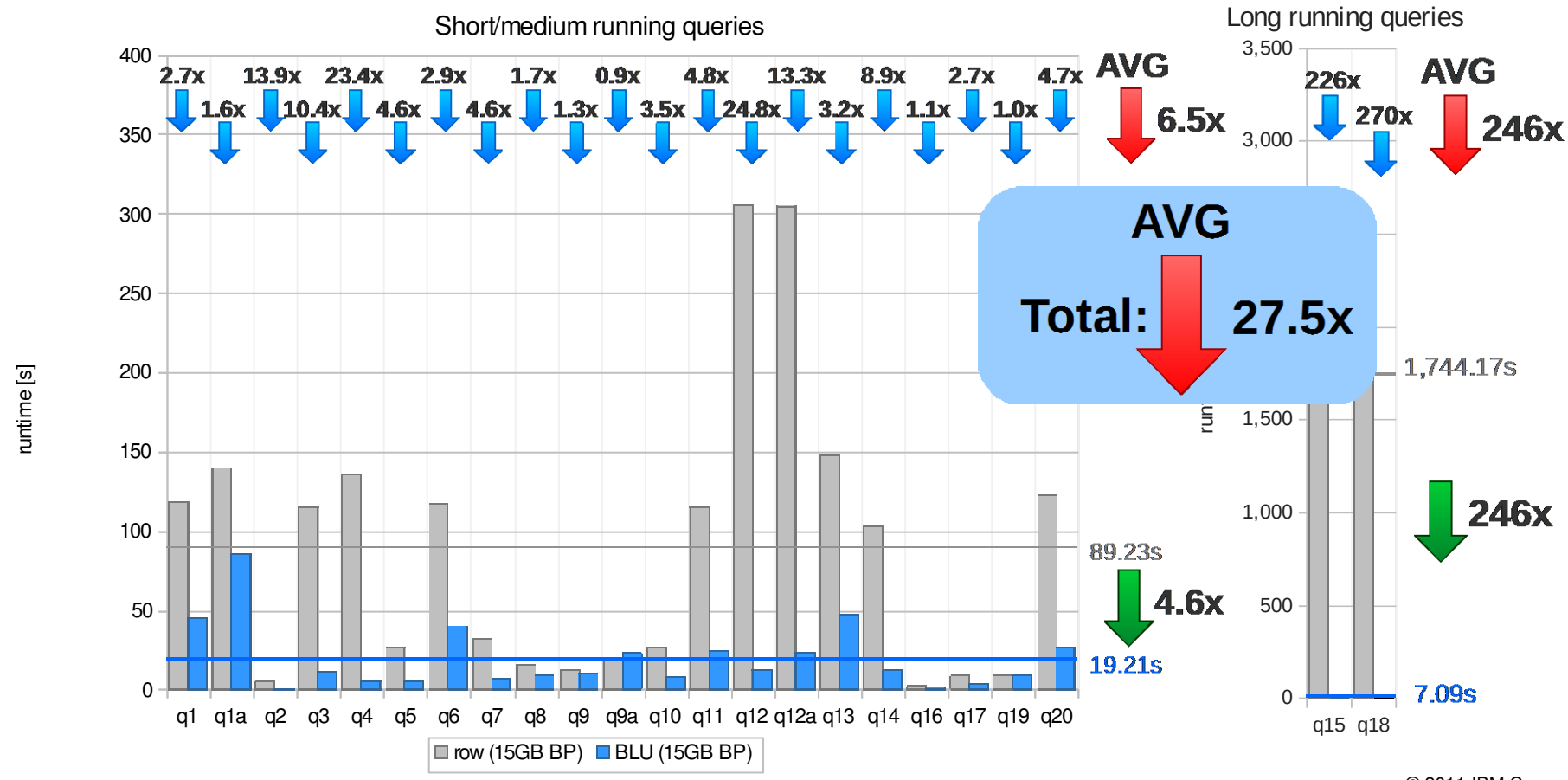
DB2 Optimized for SAP - Roadmap



BW Support on DB2 10.5 BLU – BW Query Performance (1)

BW InfoCube scenario
- Fact table with 438 Million records
- Size (table + indexes)
  - Row based (adaptive compr.): 33 GByte
  - **BLU: 12 GByte**
- DB2 parallel query degree switched ON

Test environment
- 2 Intel® Xeon® processors (8 cores in total), 2.14GHz
- 32 GB RAM
- SUSE Linux Enterprise Server V11
- SAP BW 7.30
- DB2 10.5 pre GA, **15 GB Bufferpool**



SAP BW Support on DB2 10.5 BLU – Compression

- **BW InfoCube E-fact table with 438 Million rows**
  - **Row table: 7 secondary single integer indexes, 1 compound unique index with 7 integers**
  - **BLU table: 1 compound unique index with 7 integers**

Lab Tests

F- fact table	Table size	Index Size	Total
Row, 10.5 Without Compr.	80,4 GB	42,9 GB	123,3 GB
Row, 10.5 Adapt.Compr.	26,7 GB	15.0 GB	41,7 GB
BLU, 10.5	12,3 GB	7,8 GB	20,1 GB

6,1x smaller than uncompressed
2,1x smaller than adaptive compressed

BW Support on DB2 10.5 BLU – BW Query Performance

➔ By factors faster SAP BW queries

- Fast query run time on InfoCubes without BW aggregates
- Fast query run time on DSOs

➔ No time consuming SQL query tuning

- Fast “Out of the box” performance

➔ Better prediction of BW query run time

IBM Database Offering for SAP Applications

SAP's offering:
-BW ➔ Hana
-BS ➔ HANA/Sybase ASE
- NLS ➔ Sybase IQ

Average diaglog response time 0,2 - 0,8 sec

DB2 LUW

SAP Business-Suite, Industry Solutions

OLTP workload

Average diaglog response time 0,4 – 2+ sec

DB2 LUW

SAP BW
Big Data &
op. Analytics

OLAP workload

DB2 LUW

NLS for BW
NLS for HANA

Transactional

Analytical

Near-line Storage

DB2 10.5 / BLU – Data Center Excellence
including Virtualization and Consolidation

Criteria compared with uncompressed source system	**DB2 10.5 / BLU**	**SAP HANA**
OS support	AIX, Linux, *Win*	Suse Linux
SAP release	7.0 and higher	7.30 and higher
Virtualisation (incl. production)	Yes	No
2-Tier support	Yes	No
3-Tier support	Yes	Yes
NLS (nearline storage) support as underlying database	Yes	No
Number of patches per year ****	~2	60 (SPS06)
Non-disruptive HW / IT support	Yes, utilize existing HW & IT concept	No, new HW & IT concept
Migration to and from possible with available tools	Yes	No
Percentage of source storage *	~10 to 30%	~150 to 300%
Percentage of source RAM **	~100 to 200%	~1000+%
License	OEM: based on SAV*** (8%) Direct: #users, #cores	BS/BW: 15% / 8% of SMVB RAM size based

* DB2 compression reduces storage capacity by 70-95%, depending on share of column-store objects
** DB2 9.7/10.1 requires usually 2-5% of the database size, with DB2 10.5 approx 4-10% expected
*** SAV-SAP Application Value, SMVB-SAP Maintenance Value Base
**** based on experiences with DB2 V8, V9 and DB2 10.1

Status: July 2013

SAP‘s statement about Consolidation & Virtualization

- SAP note 1681092 - Multiple SAP HANA databases on one appliance
  - SAP **does not support** running multiple SAP HANA databases (SIDS) on a single **production** SAP HANA appliance
  - SAP **does support** running multiple SAP HANA databases on a single **non-production** (DEV, QA, test)
  - running multiple DBs on one SAP HANA appliance may impact performance of various types of operations, as contention for memory resources may occur
  - SAP support will address the performance issue only if it can be shown to exist when only one DB is running on the SAP HANA appliance (...you may stop all but one of the DBs and see if the issue persists)

- SAP note 1788665 - SAP HANA running on VMware vSphere VMs
  - For **non-production** SAP HANA instances use only
  - Multiple virtual machines can be deployed on a single SAP HANA appliance. Each SAP HANA instance deployed on a virtual machine is recommended to be sized the same as SAP HANA deployed on "bare metal" SAP HANA appliances

Status: 14th July 2013

Green IT: DB2 on POWER vs HANA on Intel

Customer runs DB2 on POWER

- 180 systems, 48 production
- 26 HA (LPM*) + 26 DR (PowerHA)
- 2 data centers

➔ 4 POWER servers

Possible HANA implementation **

- 180 systems, **48 production**
- **26 HA + 26 DR clusters**
- 2 **BIGGER** or more data centers

- 48 HANA servers for production
- 52 HANA servers for HA+DR clusters
- up to 48 HANA servers for test/QA
- up to 48 HANA servers for dev
- up to 36 HANA servers for rest

➔ 101-232 HANA servers

4 POWER servers versus **101+ HANA servers !!!**

* **LPM - AIX live partition mobility**

** **SAP note 1788665, 1681092**: No virtualization and no multiple SAP HANA databases on a production SAP HANA appliance