Matthias Koechl

Senior IT Architect
IBM SAP Competence Center
Walldorf, Germany

IBM

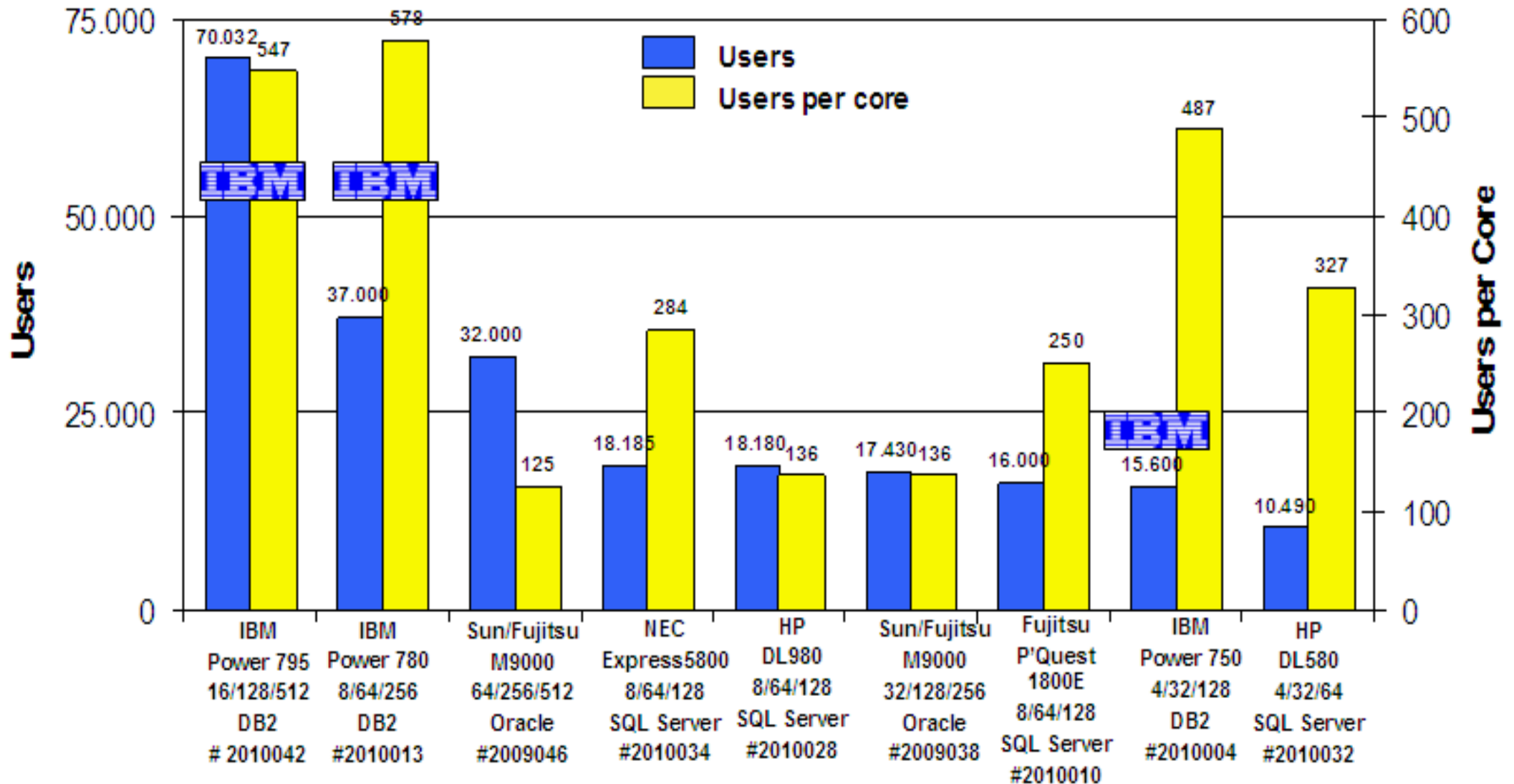# Multiply Your Power!

- combine the power of SAP® business solutions with IBM Power System™ and AIX™ strengths

POWER7
BUILT ON
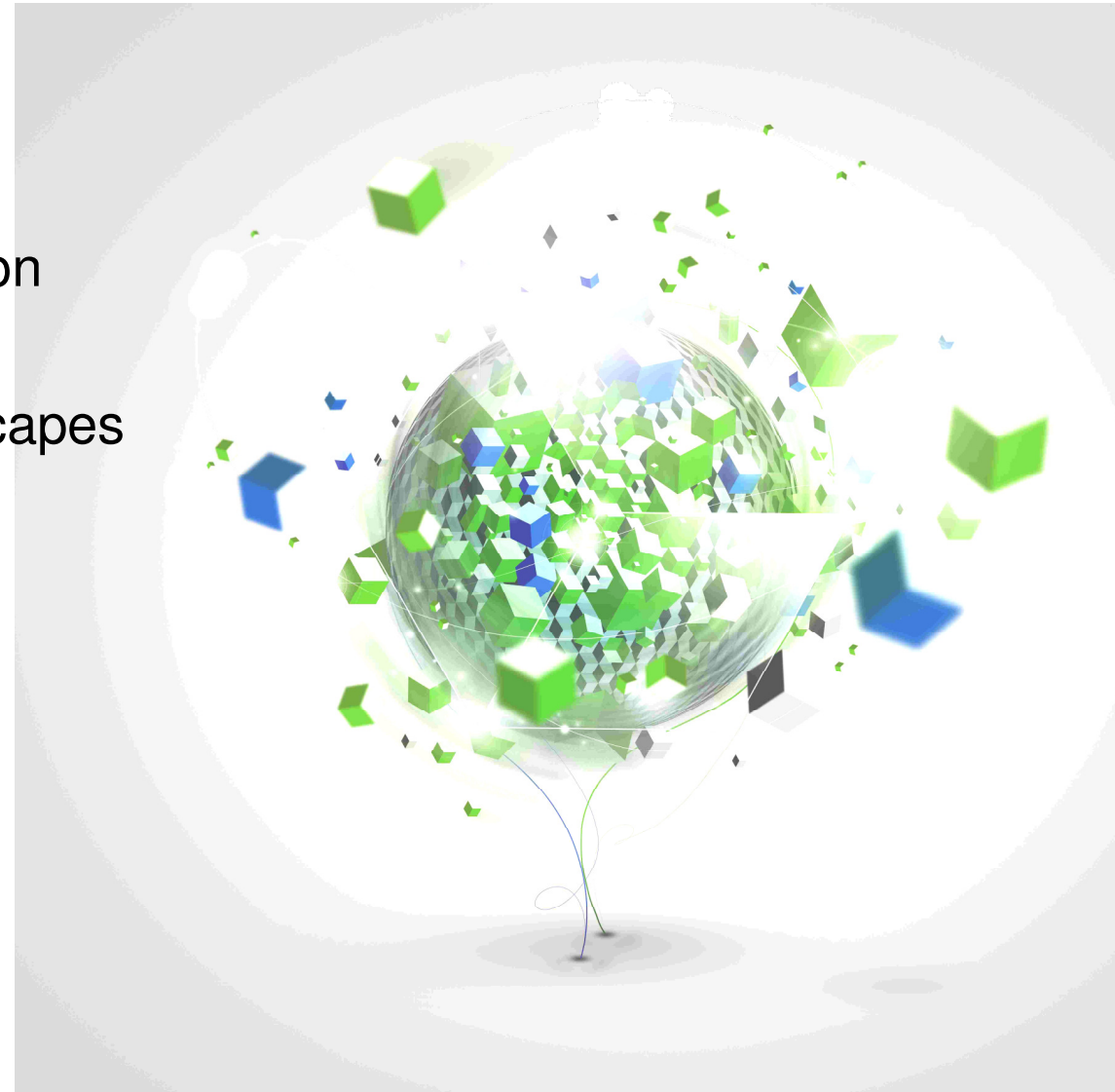
7 Power™

AIX®   Linux®
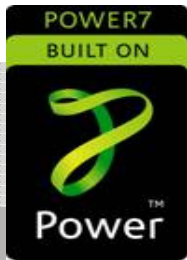
Power your planet

SAP SD 2-Tier (Unicode)

Agenda

- IBM Power System™ News

- Principles of POWER™ virtualization

- Benefits of POWER for SAP landscapes

- AIX for SAP Business Applications

- System Management

ISICC Walldorf - MK, 09/2010
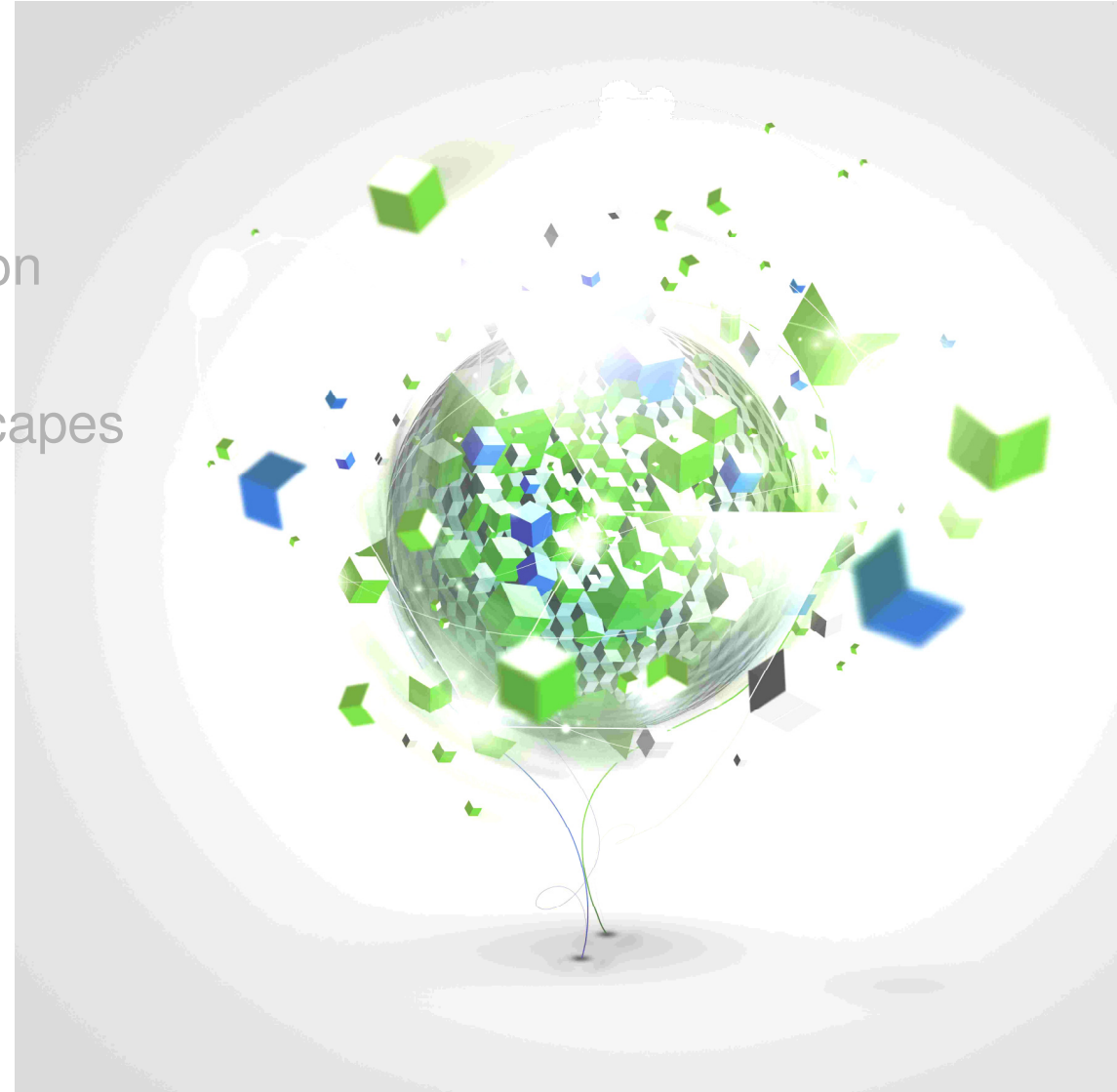
Agenda

- **IBM Power System™ News**

- Principles of POWER™ virtualization

- Benefits of POWER for SAP landscapes

- AIX for SAP Business Applications
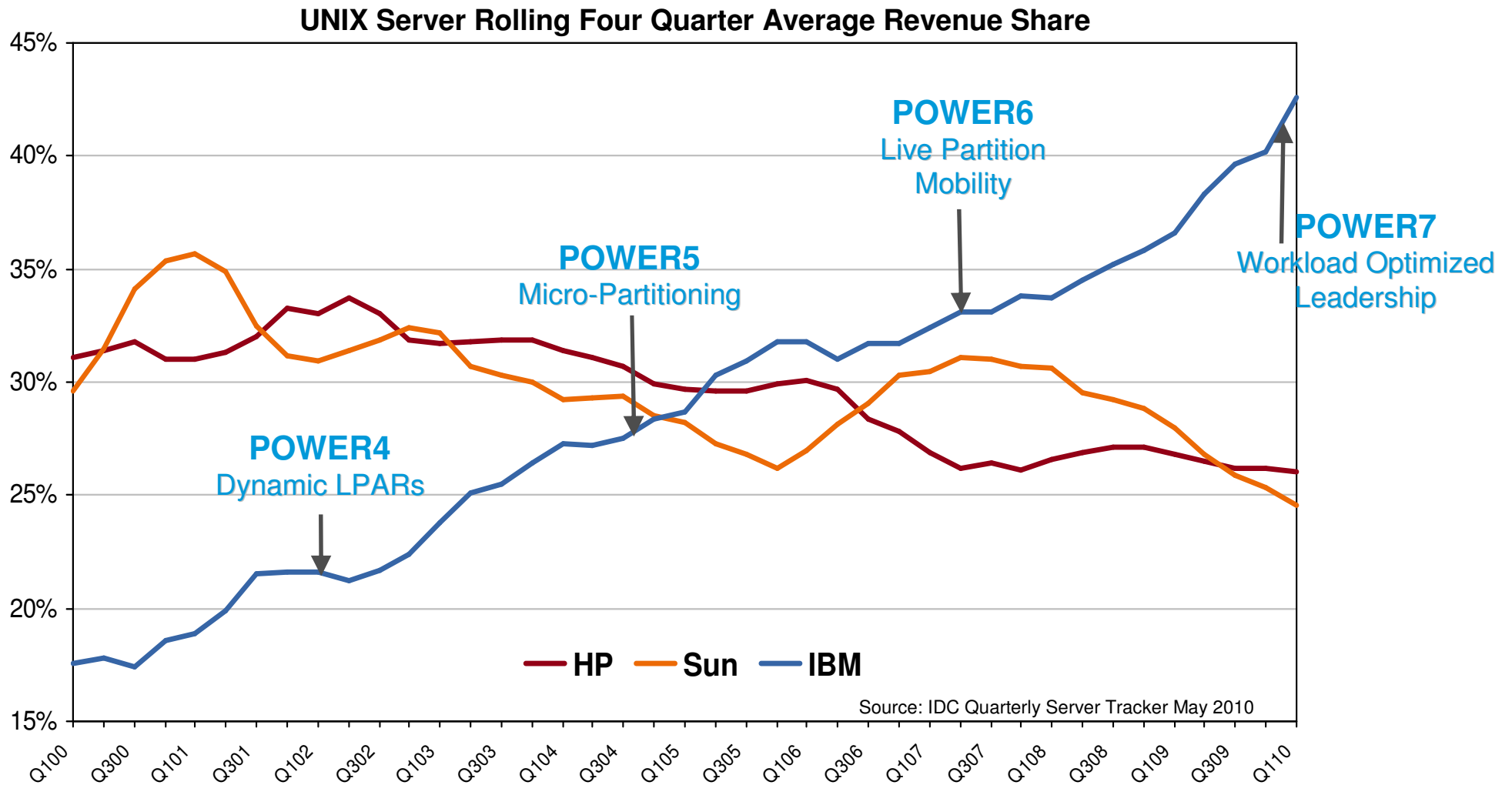
- System Management

IBM's 10 years march to Unix leadership

UNIX Server Rolling Four Quarter Average Revenue Share

POWER6
Live Partition
Mobility

POWER5
Micro-Partitioning

POWER7
Workload Optimized
Leadership

POWER4
Dynamic LPARs

— HP — Sun — IBM

Source: IDC Quarterly Server Tracker May 2010
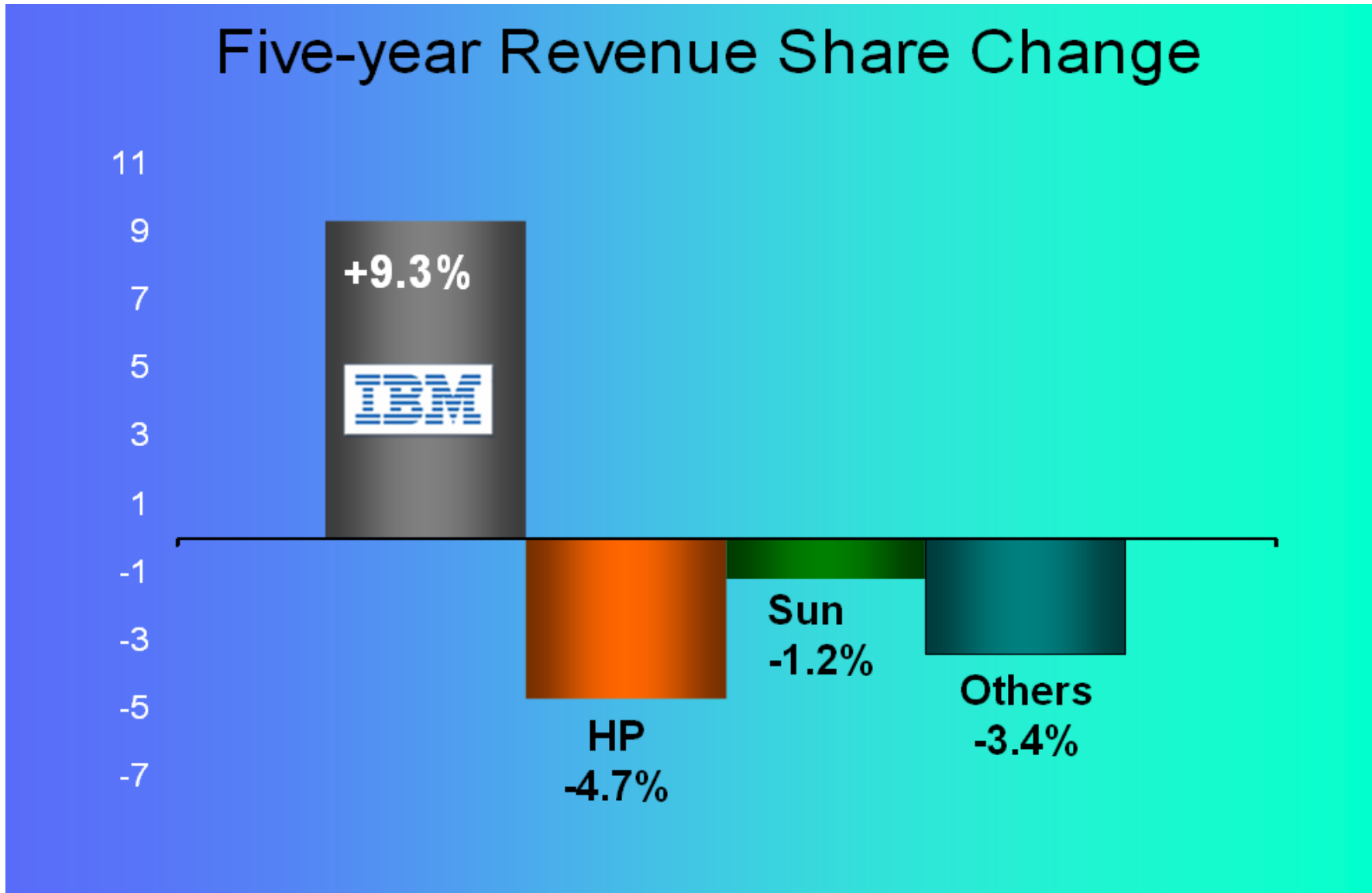
- **For SAP new installs on UNIX platform Power System w/ AIX market share is in the 50% range**
  - **Even better than overall Unix share of AIX**
  - **SAP customers rely on the excellent Power platform!**

Power Systems: Only UNIX platform to grow

Five-year Revenue Share Change

IBM +9.3%

HP -4.7%

Sun -1.2%

Others -3.4%

Source: IDC Server Tracker Q104 - Q109 Server Tracker, 06/09, rolling four quarter average
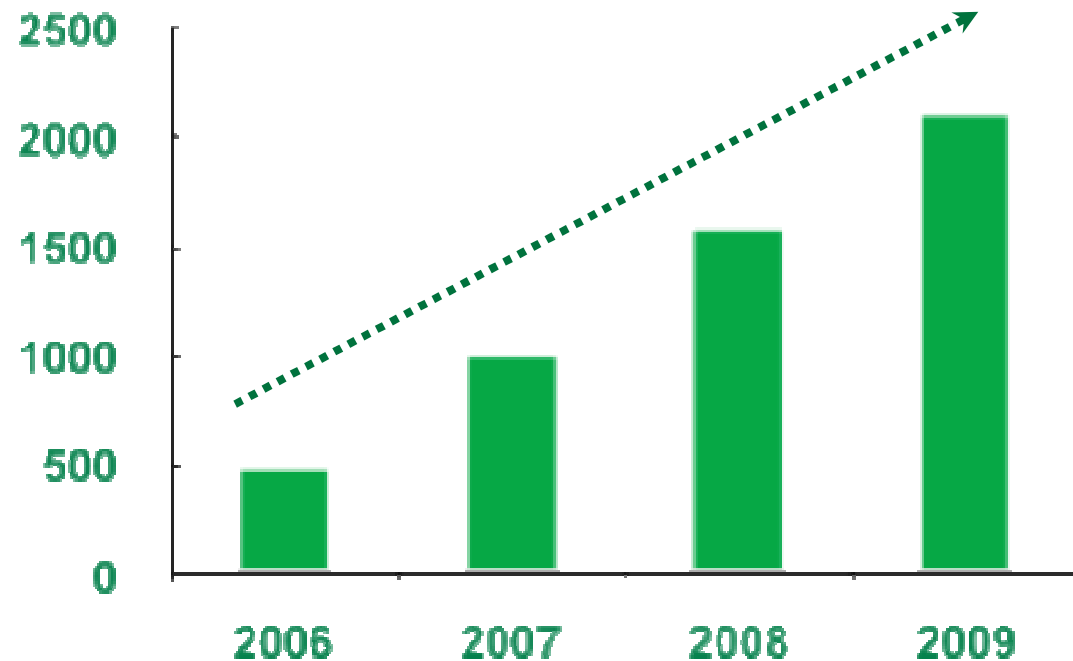
2,100

successful Power Migration Factory migrations to date.

There were over 500 Power migrations during 2009 (not all, but including SAP migrations), **with more than 90% from Sun and HP customers (including x86 consolidation). In 4Q09 alone, Power achieved nearly 200 competitive migrations.**

BUILT ON

Power™

Cumulative Migration Factory Wins

(Some) POWER7 Design Objectives

▪**Maintain/Extend Leadership of POWER6 server attributes**

▪**Dramatically improve cost/performance**
- By increased performance through
  - Out of Order Execution
  - Enhanced SMT
  - Cache Hierarchy Improvements
  - SMP capability: Up to 32 sockets (256 cores)

▪**Balance System Design**
– Cache, Memory, and IO

▪**Optimize Energy Efficiency with 8 cores on chip**
– Policy enabled energy management
– Processor Nap & Sleep Mode
– Memory Power Down support

▪**Built in Virtualization**
– Memory Expansion
– VM Control
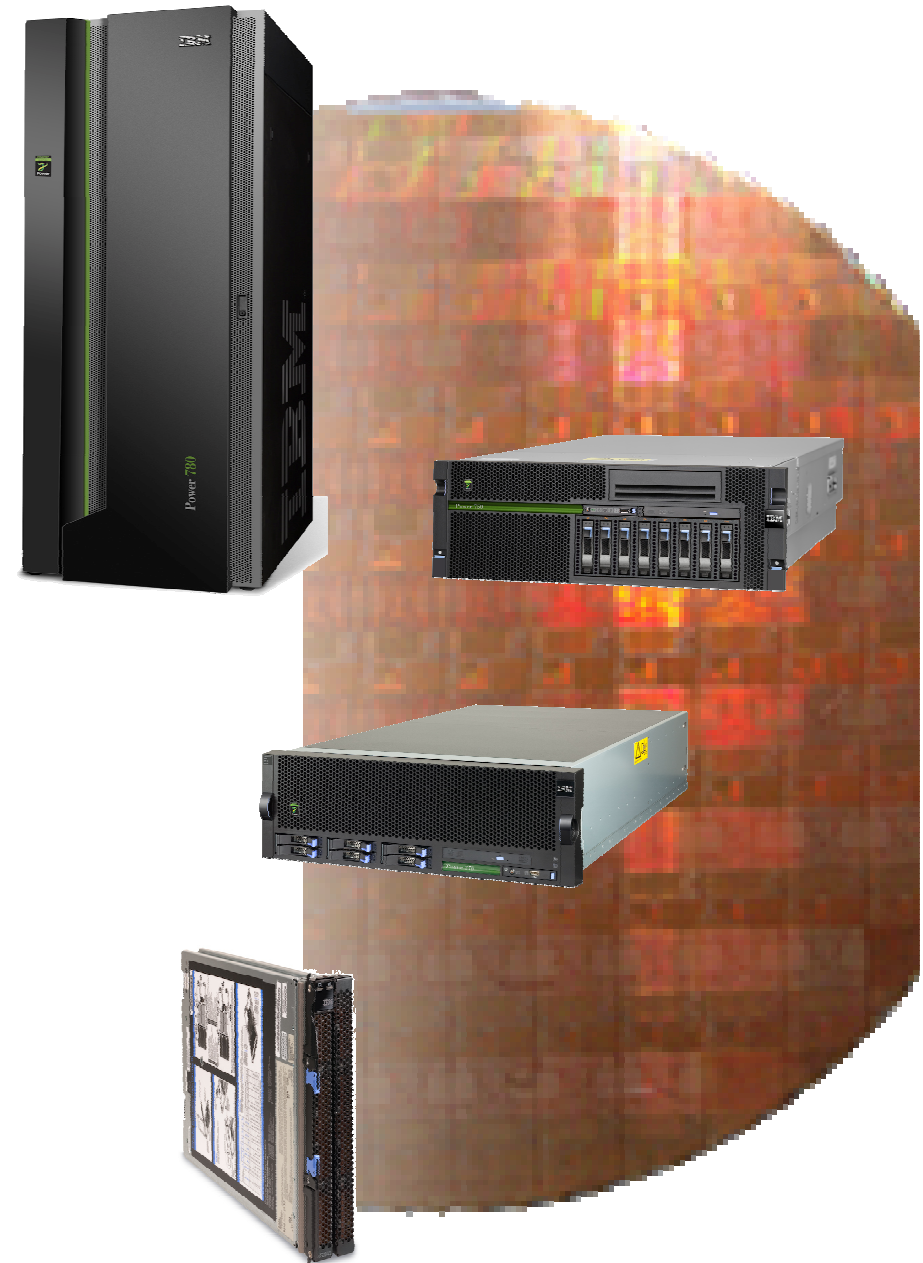
Power Systems Family - as of August 2010

- Over 7.800 customers use IBM Power Systems w/ AIX to run their SAP Business applications.

- Total of about 18.000 SAP DB-Server installs

Power 795

Power 595

Power 780

Power 770

Power 570

Power 750

Power 550

Power 560

Power 710,720,730,740

Power 520

Power 755

Power 575

HPC

PS Blades

JS Blades

IBM Systems Software

PowerHA

PowerVM

IBM Systems Director

AIX

i for Business

Linux
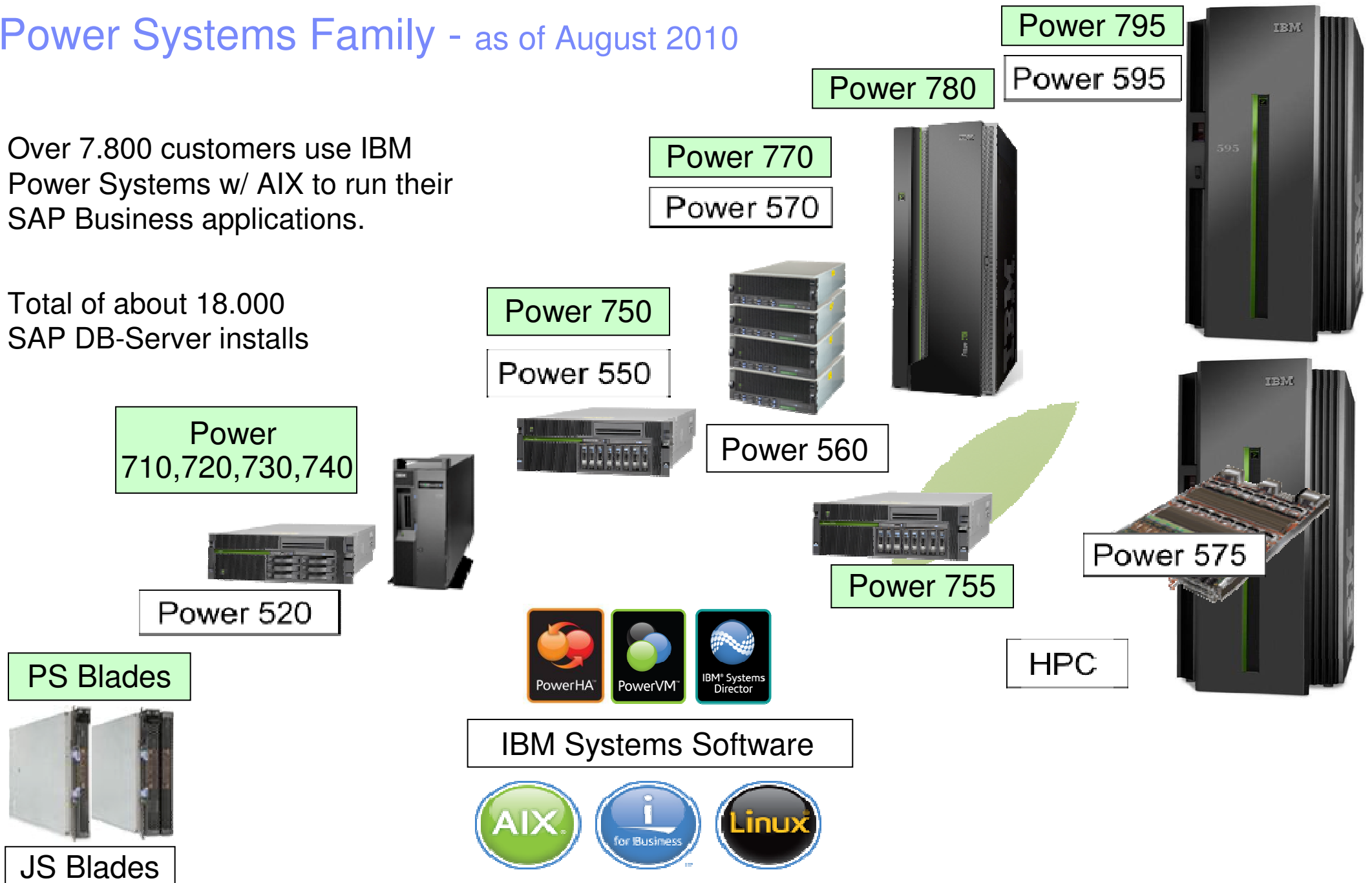
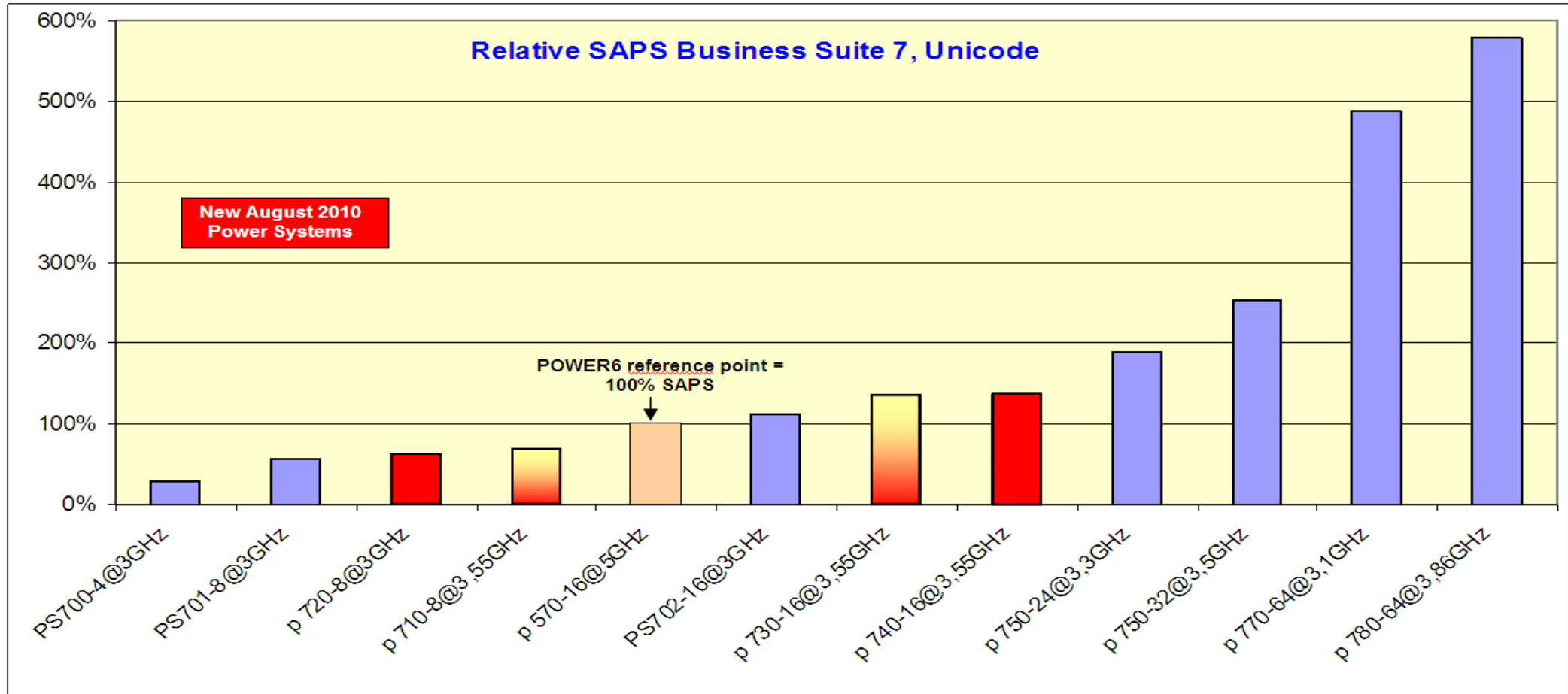# SAP comment on POWER7 launch :

"With the launch of POWER7, IBM is driving *technical excellence* *with clear* *business value* *for our customers. Using this new hardware generation, SAP customers will be able to* *extend the capacity* *of their enterprise systems and at the same time to reach even* *higher resource utilization* *levels. In addition, SAP customers will have the option to leverage new Advanced Memory Expansion technology to* *increase memory efficiency* *and new* *sustainability features* *for dynamic management of energy levels."*
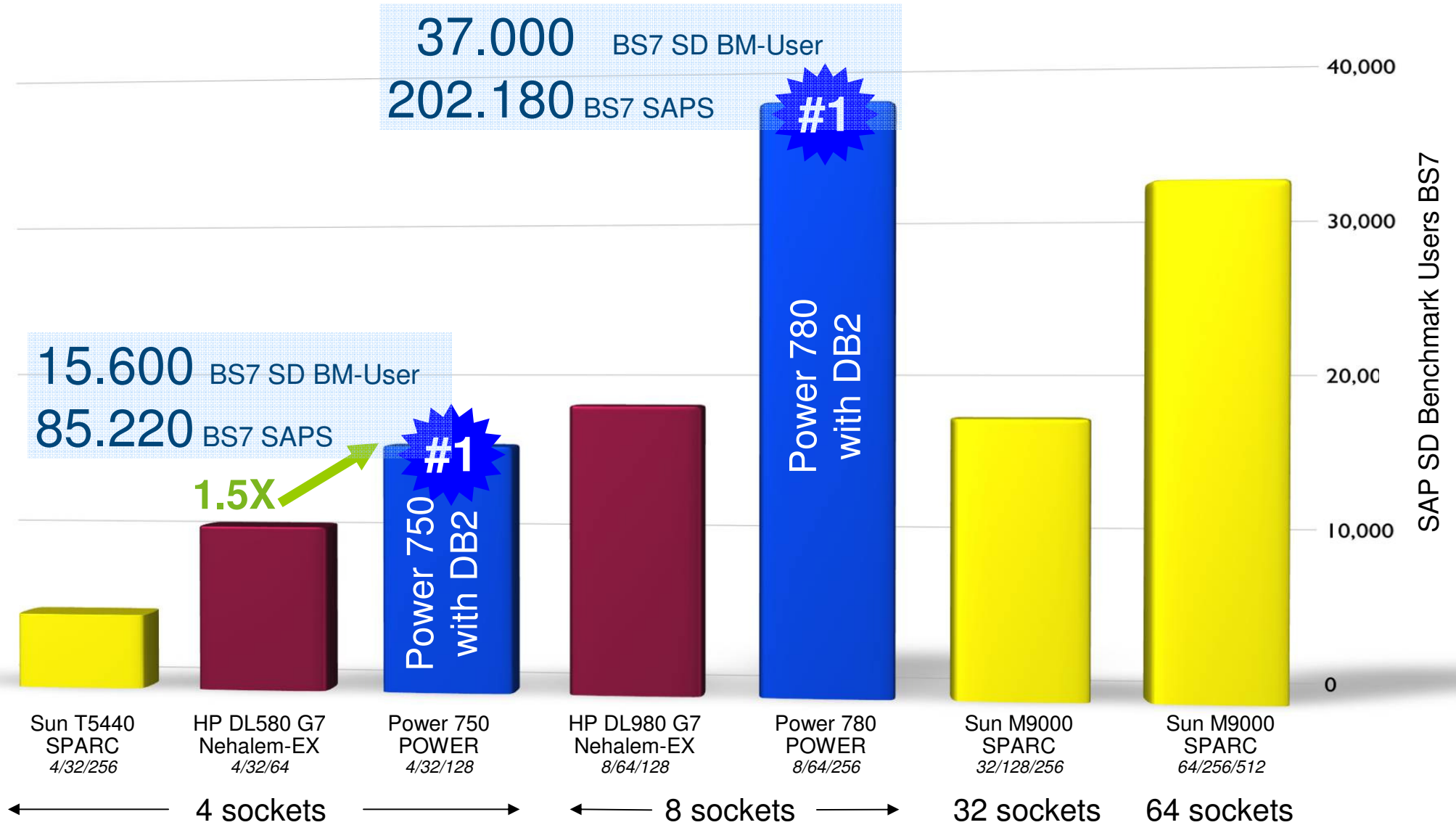
Dr. Torsten Wittkugel
Vice President SAP DB/OS Platform Development

Power Systems and their relative SAPS capacities

Relative SAPS Business Suite 7, Unicode

New August 2010 Power Systems

POWER6 reference point = 100% SAPS

(Chart categories: PS700-4@3GHz, PS701-8@3GHz, p 720-8@3GHz, p 710-8@3.55GHz, p 570-16@5GHz, PS702-16@3GHz, p 730-16@3.55GHz, p 740-16@3.55GHz, p 750-24@3.3GHz, p 750-32@3.5GHz, p 770-64@3.1GHz, p 780-64@3.86GHz)

- The newly released POWER7 systems shift achievable SAP capacity to smaller server classes
- By running AIX V6.1 or AIX V5.3, all new systems can be used for SAP production immediately after GA
    – Special considerations for new virtualization features see later in this presentation
- IBM i 6.1, IBM i 7.1, and POWER Linux SLES 10 SP3
- AIX 7.1 – announced in August 2010 – is NOT required for these systems
    – Is required to fully exploit the very high end Power 795, which is not included in this chart
    – SAP certification planned for October 2010

Power Systems offer more SAP throughput than any system in the industry

37.000 BS7 SD BM-User
202.180 BS7 SAPS

#1 Power 780 with DB2

15.600 BS7 SD BM-User
85.220 BS7 SAPS

1.5X

#1 Power 750 with DB2

SAP SD Benchmark Users BS7

40,000
30,000
20,000
10,000
0

Sun T5440 SPARC	HP DL580 G7 Nehalem-EX	Power 750 POWER	HP DL980 G7 Nehalem-EX	Power 780 POWER	Sun M9000 SPARC	Sun M9000 SPARC
4/32/256	*4/32/64*	*4/32/128*	*8/64/128*	*8/64/256*	*32/128/256*	*64/256/512*

← 4 sockets → ← 8 sockets → 32 sockets   64 sockets

Systems are listed with processor chips/core/threads under system name; IBM Power System 780, 8p / 64–c / 256–t, POWER7, 3.8 GHz, 1024 GB memory, 37,000 SD users, dialog resp.: 0.98s, line items/hour: 4,043,670, Dialog steps/hour: 12,131,000, SAPS: 202,180, DB time (dialog/ update):0.013s / 0.031s, CPU utilization: 99%, OS: AIX 6.1, DB2 9.7, cert# 2010013; SUN M9000, 64p / 256-c / 512–t, 1156 GB memory, 32,000 SD users, SPARC64 VII, 2.88 GHz, Solaris 10, Oracle 10g , cert# 2009046; All results are 2-tier, SAP EHP 4 for SAP ERP 6.0 (Unicode) and valid as of 7/13/2010; Source: http://www.sap.com/solutions/benchmark/sd2tier.epx - See Power 780 benchmark details for more information

6-year IBM i History of #1 SAP BW/BI Benchmarks … continued !

- **Power 750 8-core with IBM i scores 80% more throughput** than 8-core Power 570 for SAP Business Intelligence
  - SAP BI Mixed Load Standard Application Benchmark SAP Certification# : 2010005 / 2010xxx
  - SAP NetWeaver, query activity and load/update activity are executed in parallel
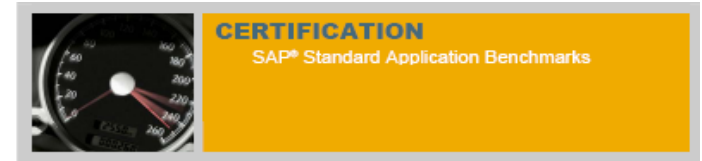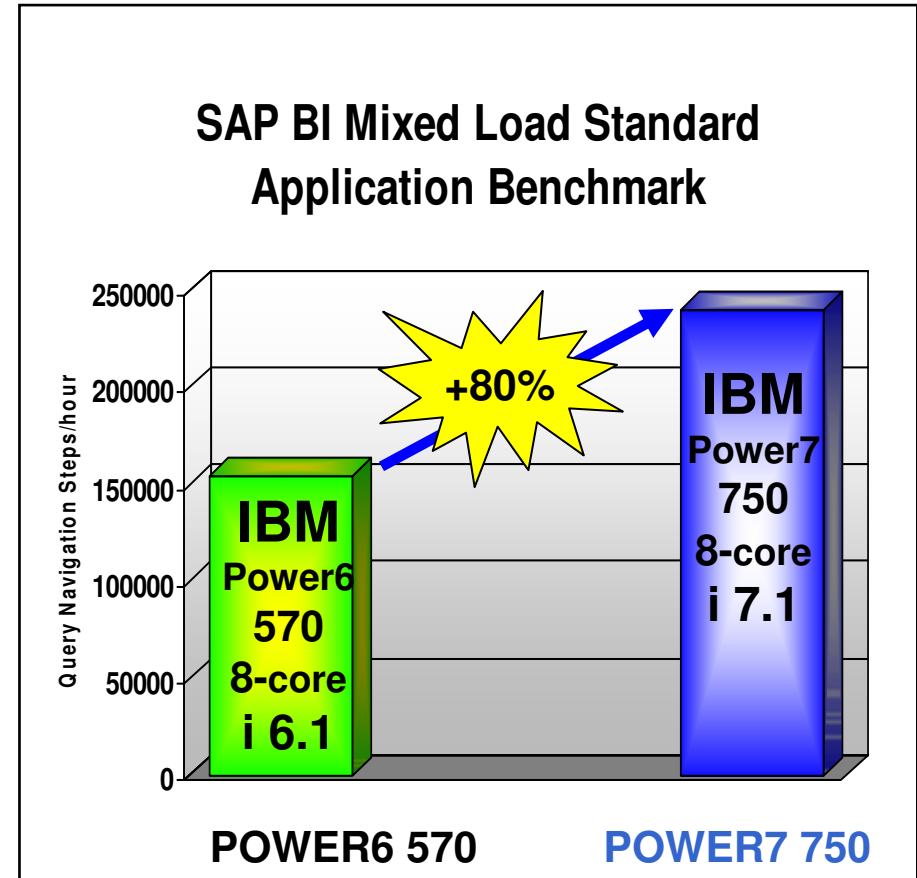
	Power 570 i 6.1	Power 750 i 6.1	Power 750 i 7.1
Processor	8-core 4.20 GHz	8-core 3.30 GHz	8-core 3.30 GHz
Memory	128 GB	128 GB	128 GB
Throughput (Query Navig.Steps/ hour)	154,920	241,526	278,462

- **Configuration**
  - IBM i 6.1 / I 7.1 with DB2 for IBM i
  - SAP NetWeaver 7.0
  - 300,000,000 Records

IBM Power 750

SAP BI Mixed Load Standard Application Benchmark

POWER6 570   POWER7 750

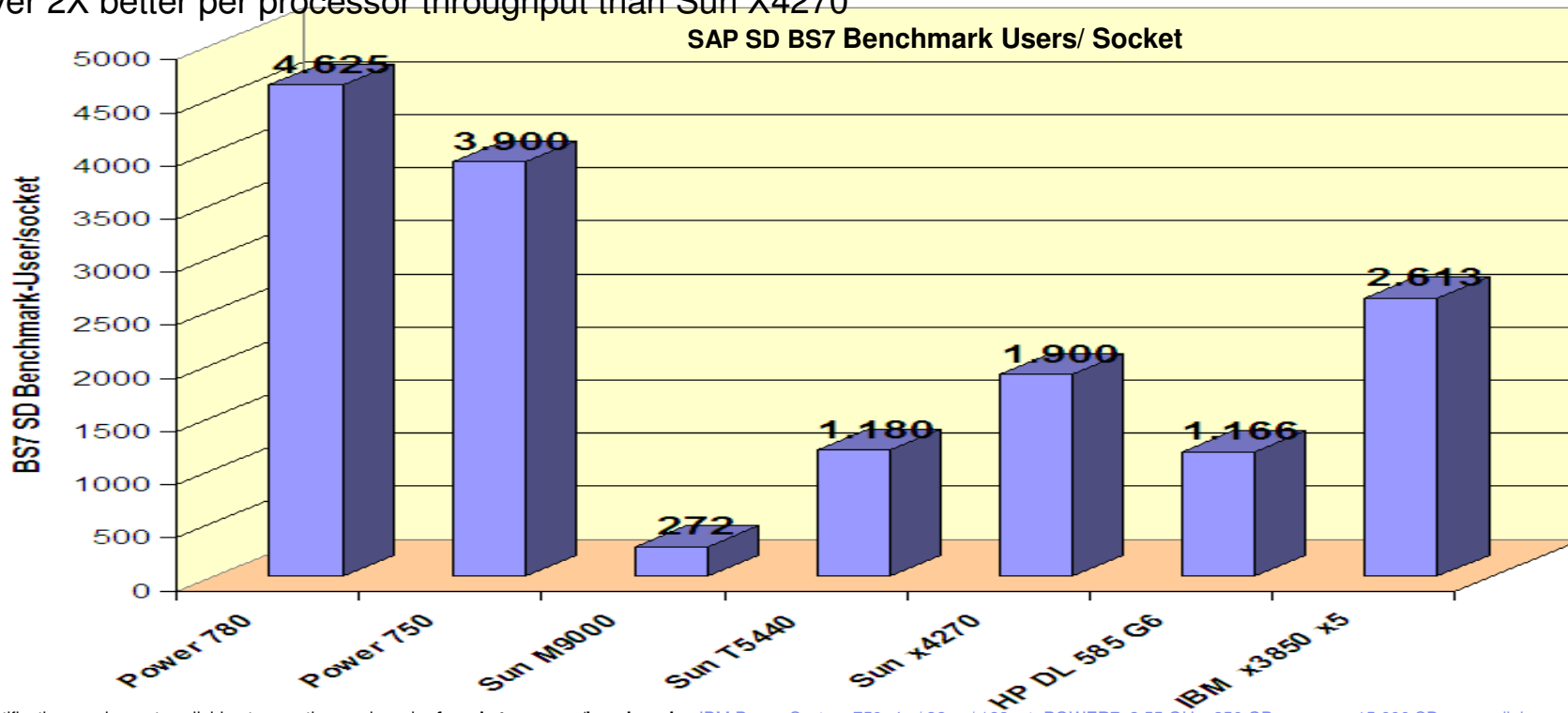http://www.sap.com/solutions/benchmark/bimxl.epx

New Power Systems boost your SAP ERP capacity

- The new Power benchmarks increase SAP Sales and Distribution ERP 6.0 EHP4 (aka Business Suite 7) 2-Tier throughput to new levels:

- E.g., Power 750 provides
  - Over 7X better per processor throughput than Sun SPARC M9000
  - Over 3X better per processor throughput than Sun SPARC T5440
  - Over 3X better per processor throughput than HP ProLiant DL585 G6
  - Over 2X better per processor throughput than Sun X4270

IBM Power 750 Express

SAP SD BS7 Benchmark Users/ Socket

Bar chart titled "SAP SD BS7 Benchmark Users/ Socket", y-axis labeled "BS7 SD Benchmark-User/socket" ranging 0 to 5000:
- Power 780: 4,625
- Power 750: 3,900
- Sun M9000: 272
- Sun T5440: 1,180
- Sun x4270: 1,900
- HP DL 585 G6: 1,166
- IBM x3850 x5: 2,613

IBM Power 750 certification number not available at press time and can be **found at sap.com/benchmarks**. IBM Power System 750, 4p / 32–c / 128 – t, POWER7, 3.55 GHz, 256 GB memory, 15,600 SD users, dialog resp.: 0.98s, line items/hour: 1,704,330, Dialog steps/hour: 5,113,000, SAPS: 85,220, DB time (dialog/ update):0.015s / 0.028s, CPU utilization: 99%, OS: AIX 6.1, DB2 9.7:   SUN M9000 32p / 128–c / 256–t, 1024 GB memory, 17430 SD users, SPARC VII QC, 2.88 GHz, Solaris 10, Oracle 10g, cert#: 2009038; SUN T5540, 4p / 32-c / 256 –t, 256 GB memory, 4720 SD users, UltraSPARC T2 plus OC, 1.6 GHz, Solaris 10, Oracle 10g , cert# 2009026-1; SUN X4270, 2p / 8-c / 16-t, 256 GB memory, 3800 SD users, Xeon X5570 QC, 2.93 GHz, Solaris 10, Oracle 10g, cert#: 2009033, HP DL585 G6, 4p / 24-c / 24-t, 64 GB memory, 4665 SD users, AMD Opteron 8439 SE, 2.8 GHz, Windows Server 2008 EE, , SQL Server 2008, cert#: 2009025.   **All results are 2-tier, SAP EHP 4 for SAP ERP 6.0 (Unicode) and valid as of 2/9/2010.**
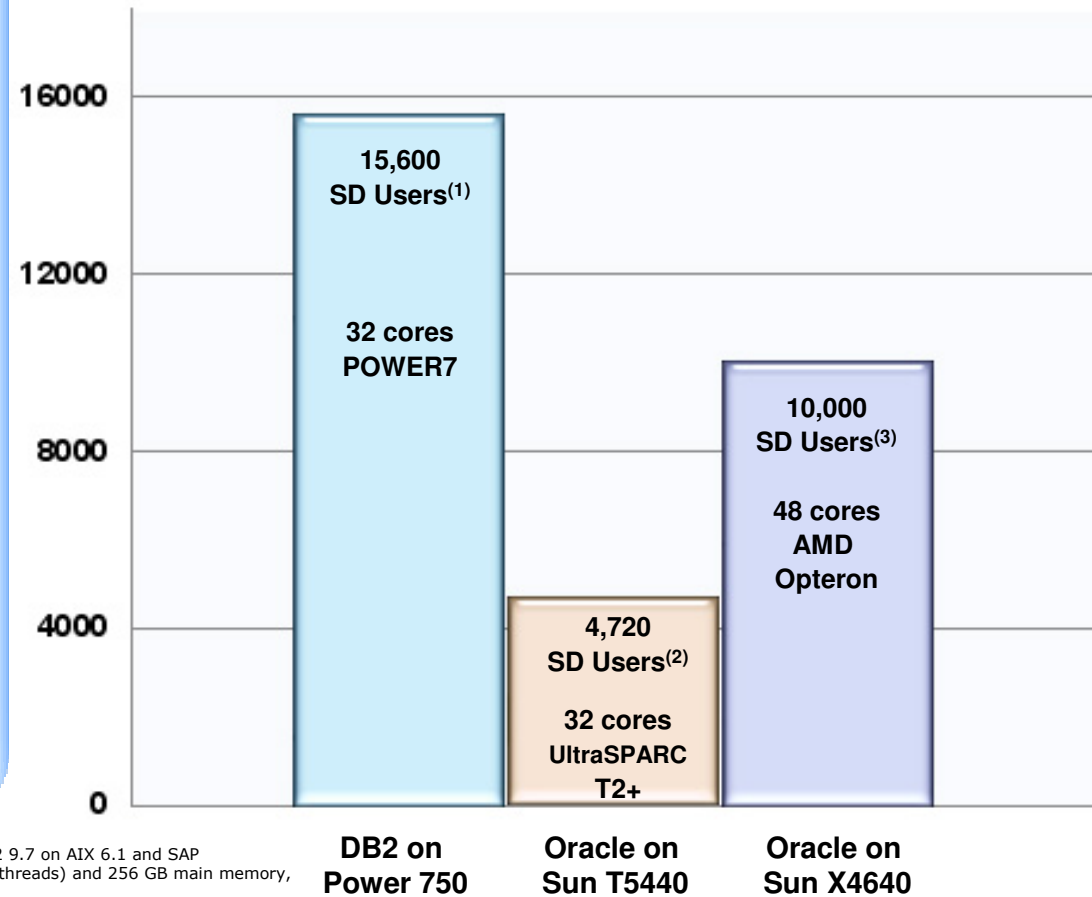
IBM

Simplify SAP Infrastructure And Reduce Costs

SAP and DB2 on Power 750

3.3x

More SD users on DB2 and Power 750 than Oracle on SPARC T5400

SAP Sales and Distribution ERP 6.0 EHP4 2-Tier performance

15,600 SD Users[1]	32 cores POWER7
10,000 SD Users[3]	48 cores AMD Opteron
4,720 SD Users[2]	32 cores UltraSPARC T2+

DB2 on Power 750   **Oracle on Sun T5440**   **Oracle on Sun X4640**

(1) IBM SAP 2-Tier SD result of 15,600 SD (Sales & Distribution) users (Average dialog response time: 0.98 second), running DB2 9.7 on AIX 6.1 and SAP enhancement package 4 for SAP ERP 6.0 on the IBM Power System 750 with 4 POWER7 3.55 GHz processor chips (32 cores, 128 threads) and 256 GB main memory, certification Number: 2010004. For more details, see http://www.sap.com/benchmark.

(2) Sun Microsystems SAP 2-Tier SD result of 4,720 SD (Sales & Distribution) users (Average dialog response time: 0.97 second), running Oracle 10g on Solaris 10 and SAP enhancement package 4 for SAP ERP 6.0 (Unicode) on the SPARC Enterprise T5440 with 4 UltraSPARC T2 Plus 1.6 GHz processor chips (32 cores, 256 threads) and 256 GB main memory, certification Number: 2009026. For more details, see http://www.sap.com/benchmark.

(3) Sun Microsystems SAP 2-Tier SD result of 10,000 SD (Sales & Distribution) users (Average dialog response time: 0.90 second), running Oracle 10g on Solaris 10 and SAP enhancement package 4 for SAP ERP 6.0 (Unicode) on the Sun Fire X4640 with 8 AMD Opteron 8435 Processors at 2.6 GHz (48 cores, 48 threads) and 256 GB main memory, certification Number: 2009049. For more details, see http://www.sap.com/benchmark.

(1) (2) (3) Results as of 3/29/2010

Information Management

IBM POWER7 & DB2 – an unbeatable combination!

Power 780

Power 750

M9000

T5440

X4640

- **3.3x** the performance of a SPARC Enterprise T5440 [2] [4]

- **3.7x** the performance of an AMD-based Sun Fire X4640 [3] [5]

- **2.1x** the performance with **½ the cores** of SPARC64 M9000 [3] [6]

(1)   Based on SAP published data as of 3/24/2010. For more details, see http://www.sap.com/benchmark .

(2)   IBM SAP 2-Tier SD result of 15,600 SD (Sales & Distribution) users (Average dialog response time: 0.98 second), running DB2 9.7 on AIX 6.1 and SAP enhancement package 4 for SAP ERP 6.0 (unicode) on the IBM Power System 750 with 4 Power7 3.55 GHz processor chips (32 cores, 128 threads) and 256 GB main memory, certification Number: 2010004. Result current as of 3/24/2010.

(3)   IBM SAP 2-Tier SD result of 37,000 SD (Sales & Distribution) users (Average dialog response time: 0.97 second), running DB2 9.7 on AIX 6.1 and SAP enhancement package 4 for SAP ERP 6.0 (unicode) on the IBM Power System 780 with 8 Power7 3.86 GHz processor chips (64 cores, 256 threads) and 512 GB main memory, certification Number: 2010xxx. Result current as of 3/24/2010

(4)   Sun SAP 2-Tier SD result of 4,720 SD (Sales & Distribution) users (Average dialog response time: 0.97 second), running Oracle 10g on Solaris 10 and SAP enhancement package 4 for SAP ERP 6.0 (unicode) on the SPARC Enterprise T5440 with 4 UltraSPARC T2 Plus1.6 GHz processor chips (32 cores, 256 threads) and 256 GB main memory, certification Number: 2009026. Result current as of 3/24/2010.

(5)   Sun SAP 2-Tier SD result of 10,000 SD (Sales & Distribution) users (Average dialog response time: 0.90 second), running Oracle 10g on Solaris 10 and SAP enhancement package 4 for SAP ERP 6.0 (unicode) on the Sun Fire X4640 with 8 AMD Opteron Processor 8435, 2.6 GHz processor chips (48 cores, 48 threads) and 256 GB main memory, certification Number: 2009049. Result current as of 3/24/2010.

(6)   Sun SAP 2-Tier SD result of 17,430 SD (Sales & Distribution) users (Average dialog response time: 0.95 second), running Oracle 10g on Solaris 10 and SAP enhancement package 4 for SAP ERP 6.0 (unicode) on the SPARC Enterprise Server M9000 with 32 SPARC64 VII, 2.88 GHz processor chips (128 cores, 256 threads) and 256 GB main memory, certification Number: 2009038. Result current as of 3/24/2010.

POWER7 – designed for mission critical SAP applications

Operating System
Hot patch Kernel
Storage Keys

Hot Plug / Removal
Fans & Power Supplies

Hot Plug / Removal
PCI-X & PCIe Adapters
IO Drawers

Hot Plug / Removal
Disks

Hot Add
I/O racks

Memory
Chip Kill technology with
Bit-steering

Dual Clocks
770/780/795

Concurrent Add: 770/780
Eliminates Upgrade outages

Concurrent Service 770/780
Eliminates Repair Outages

Passive backplane
No active components

First Failure Data Capture
Help eliminates intermittent failures

Hypervisor
Mainframe technology

Mobility
Partition Mobility

Processors
Dynamic De-Allocation
Packaging
Instruction Retry
Alternate Processor Recovery

Agenda

- IBM Power System™ News

- **Principles of POWER™ virtualization**

- Benefits of POWER for SAP landscapes

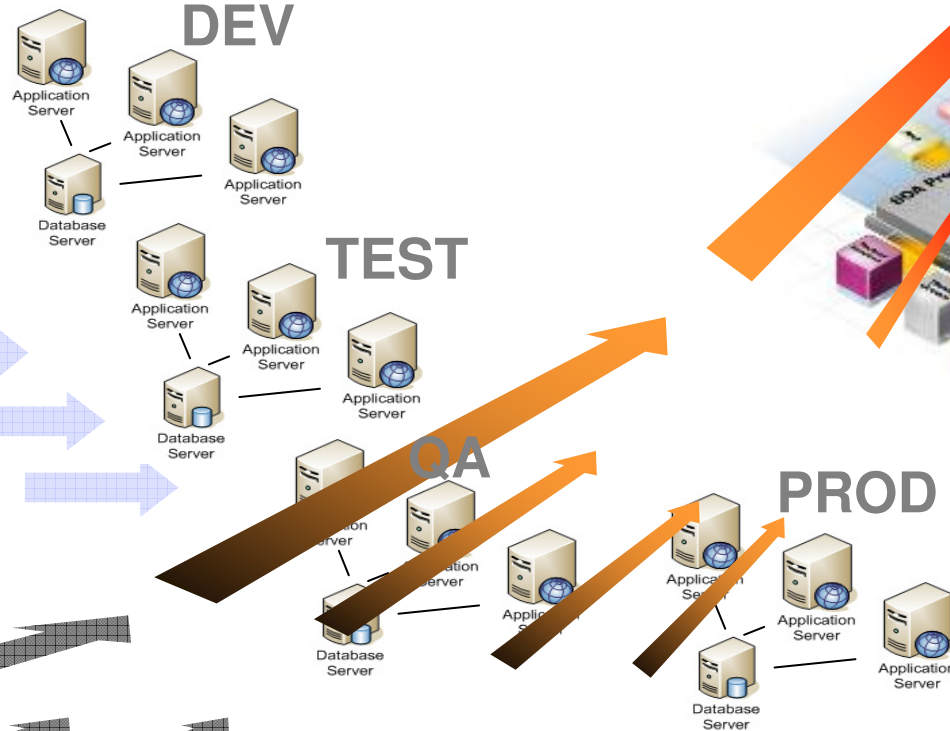- AIX for SAP Business Applications
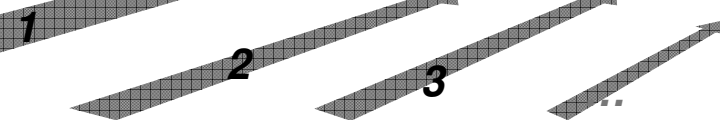
- System Management

New SAP Environments are Growing in Size and Complexity

Multiple Servers for each
SAP System Landscape
are required by SAP

DEV

TEST

QA

PROD

Application
Server

Application
Server

Application
Server

Database
Server

SAP System

1

2

3

..
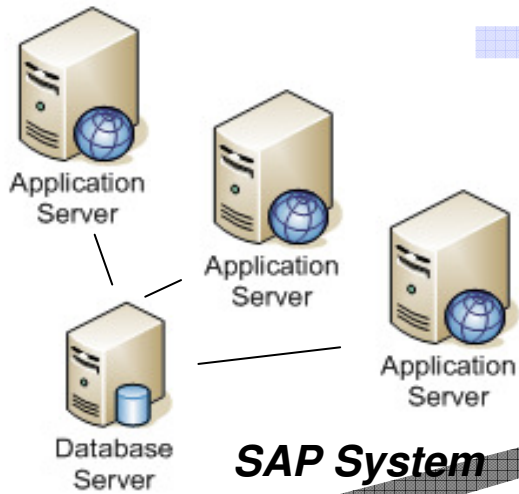
Multiple system
landscapes per SAP
functional solution

Multiple operational stages per System

2001	**2003**	**2005**	**2006/7**	**2008+**
1 landscape	2 landscapes	5 landscapes	9 landscapes	14 landscapes
59 batch jobs	2 upgrades/yr	4 parallel rollouts	6 parallel rollouts	9 parallel rollouts
400 users	124 batch jobs	3 upgrades/yr	8 upgrades/yr	8 upgrades/yr
	850 users	198 batch jobs	310 batch jobs	412 batch jobs
		1400 users	2800 users	3100 users

Virtualization in SAP Environments
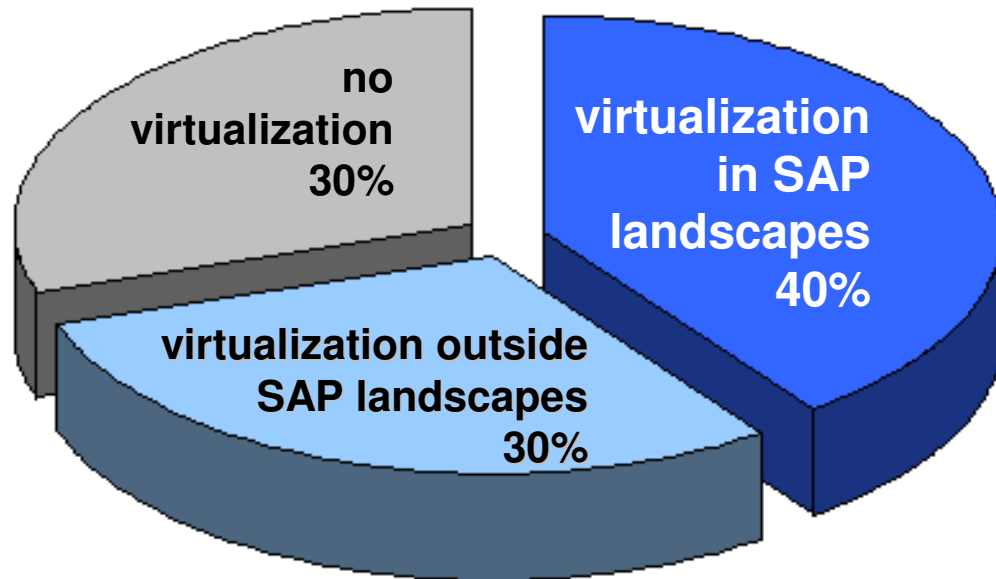
- 1.450 SAP decision makers (Germany)

- 70 percent of SAP customers has experience with virtualization

- 30 percent use virtualization for non SAP Server (e.g. Web, File-Print Server, Mail Server)

- 40 percent use virtualization in SAP landscapes

  - 30% Test, Development

  - 26% productive SAP Application Server

  - 21 % productive Database Server

Source: RAAD,Germany, D,Nov/Dec 2008, n=1450 (www.raad,de)

PowerVM: Virtualization without Limits
*A key decision point for your cloud environment*

Enterprise QOS virtualization capability with **higher performance**, **more scalability**, and **enterprise security**

✓ Drive systems to over **90% utilization**

✓ **Live Partition Mobility** with VM's of any size up to the entire system that can easily move between your POWER6 and POWER7 systems

✓ **Scales seamlessly from 1/10 of a core to 256 cores** and can use all resources of the host server

✓ **Dynamic changes** to any IT resource without reboot

✓ **Integrated storage virtualization** for simplified provisioning, management of virtual servers and advanced virtual networking*

✓ **Secure by design** with Zero common vulnerabilities exposures (CVEs) reported against PowerVM by US CERT or by MITRE Corporation.

*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Some features require the purchase of additional software components.

# Combine functional Integration and Consolidation

POWER Approach
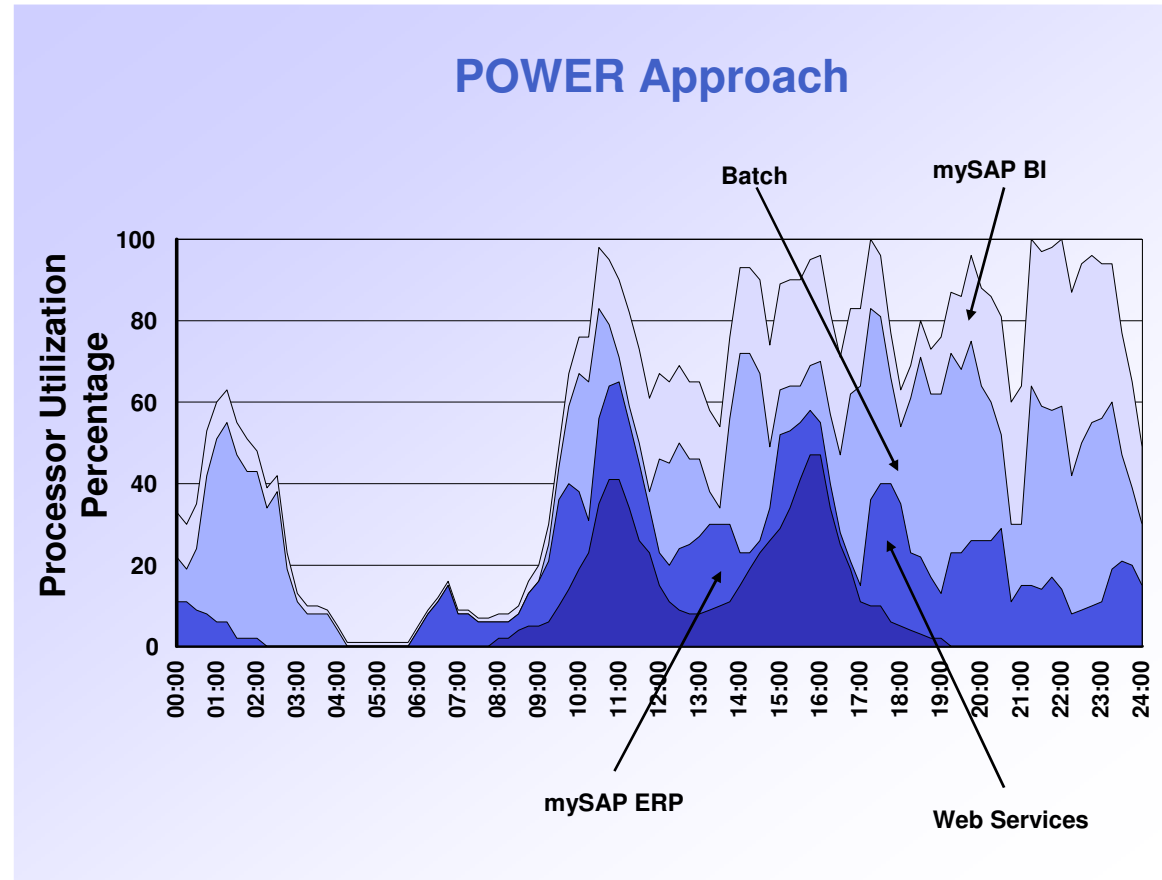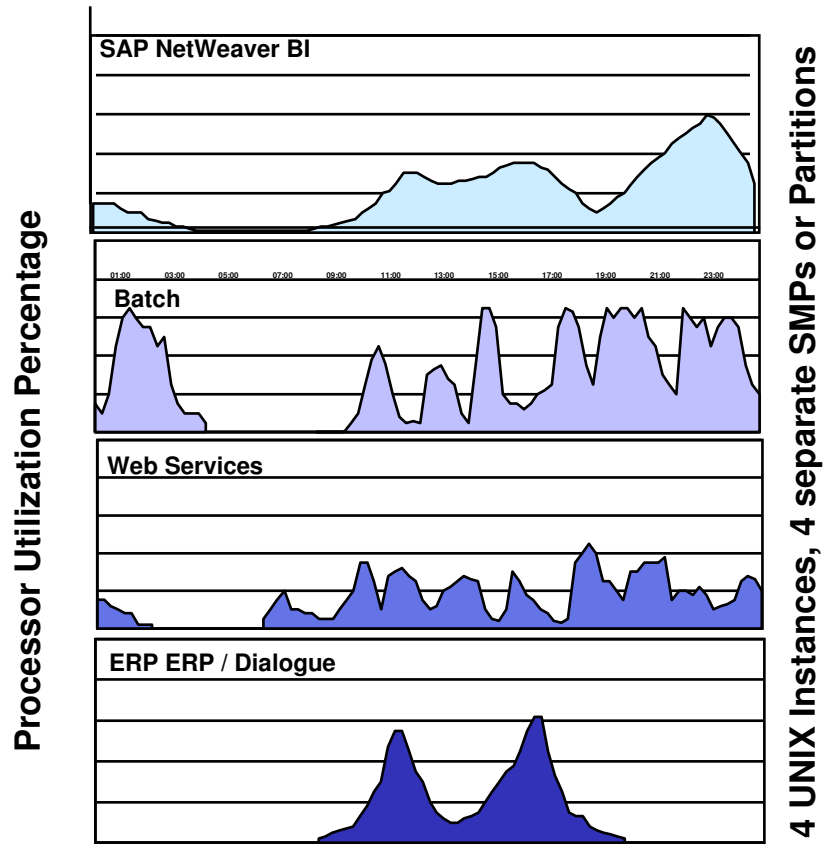
- Many SAP applications are integrated from a business and date perspective but not from a workloads point of view
- They are managed as separate servers/LPARs
- Results in low degree of synergy

- POWER processor-based systems and manageability features will allow for workload 'combination' while still keeping applications distinct
  - Improved system efficiency
  - Less TCO
  - Less energy
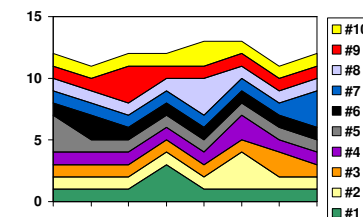
Active Memory Expansion & Active Memory Sharing

Active Memory **Expansion**

- Effectively gives more memory capacity to the partition
  ➔ *"memory expansion"*
  - Efficiency depends on compressibility of in-memory content
- AIX partitions only
- Easy initialization via HMC
- Instantaneous effect when activated

- Potential of HW assistance
- Permanently requires few CPU cycles
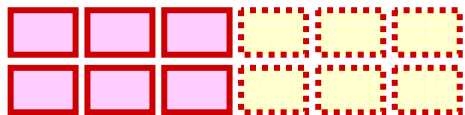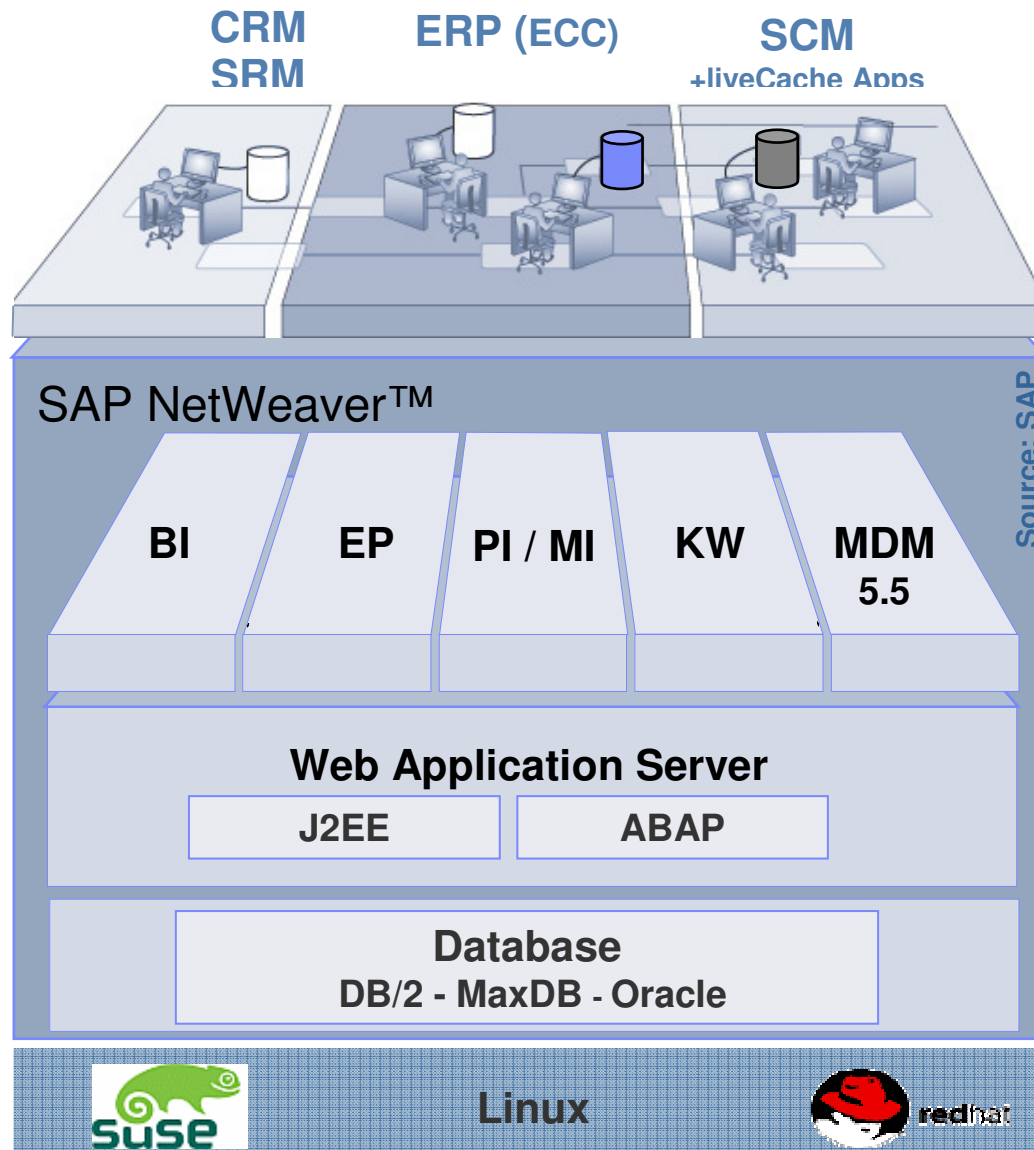
Active Memory **Sharing**

- Moves memory from one partition to another ➔ *"memory pooling"*
  - Latency of memory availability
  - Best fit when one partition is not busy while another partition is busy
- AIX, IBM i, and Linux partitions
- Comparably complex to setup
- Latency until pooled memory available to application
- N/A
- No CPU cycles required after memory allocation done

IBM Power Linux Provides Native Support for SAP Software

SAP NetWeaver™

CRM SRM   **ERP (ECC)**   **SCM +liveCache Apps**

Source: SAP

| BI | EP | PI / MI | KW | MDM 5.5 |

Web Application Server

| J2EE | ABAP |

Database
DB/2 - MaxDB - Oracle

suse   **Linux**   **redhat**

- **SAP NetWeaver & NW Components**
  - NetWeaver 7.20 CE
  - NetWeaver 7.10, 7.11 PI & CE
  - NetWeaver 7.0 , 7.01, 7.02
  - NetWeaver 2004

- **SAP Application Components**
  - Business Suite 7
  - Business Suite 2005
  - Business Suite 2004
  - WebAS 6.20 Based Applications

- **Supported Databases**
  - MaxDB 7.5, 7.6, 7.7, 7.8
  - Oracle 9i, 10g – 10.2.0.4
  - DB2 V9.1, V9.5, V9.7
  - DB400 V5R4, V6.1

Agenda

- IBM Power System™ News

- Principles of POWER™ virtualization

- **Benefits of POWER for SAP landscapes**

- AIX for SAP Business Applications

- System Management

Faster Memory Bandwidth ideally fits growing demand by SAP applications

POWER5

POWER6

POWER7

| Memory Performance:
2x DIMM | Memory Performance:
4x DIMM | Memory Performance:
6x DIMM |

DDR2 @ 553 MHz
Effective Bandwidth:
1.1 GB/s

DDR2 @ 553 / 667 MHz
Effective Bandwidth:
2.6 GB/sec
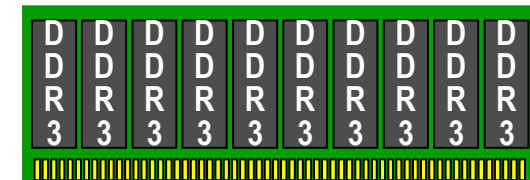
DDR3 @ 1066 MHz
Effective Bandwidth:
6.4 GB/sec

Intelligent Threads - Simultaneous Multithreading SMT4

- Still Memory and Caches are not fast enough to feed POWER7 processor pipelines
  - SMT4 allows 4 threads (programs) to execute in parallel on a single core
- A single physical core will per default appear as 4 logical processors to AIX/Linux and SAP.
- Fully transparent to (SAP) Applications and DBs
  - despite the fact of higher transaction throughput
  - SMT is most beneficial to highly utilized systems
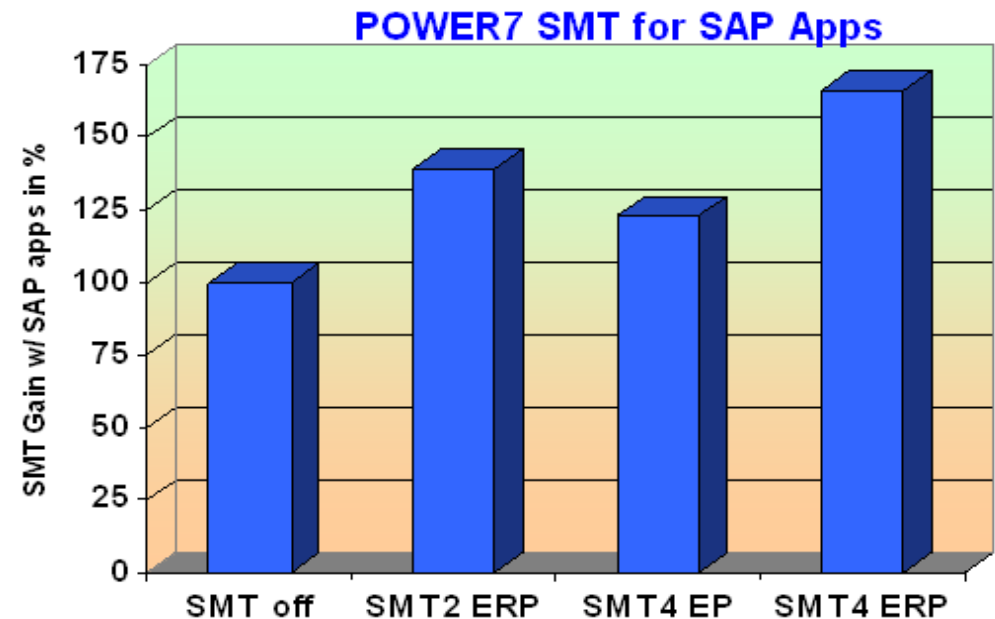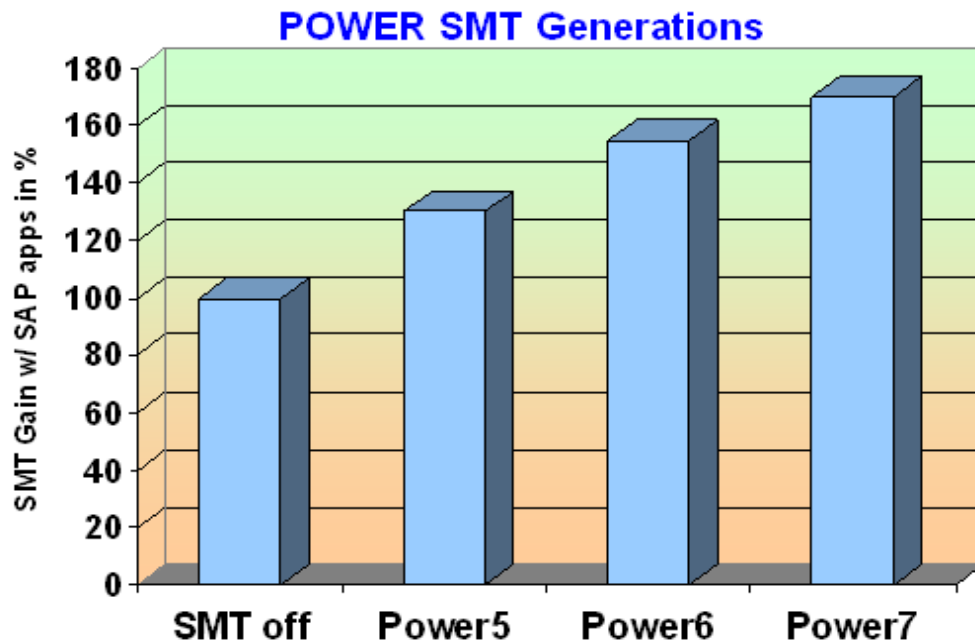
All measurements performed at >90% utilization using different SAP workloads

POWER6 introduces Multiple Shared Pools

- Combine advantages of shared resource pooling with classical processor based billing methods
  - Optimize license cost by hard limiting maximum LPAR extensions
    - Not relevant for customers who acquire DB-license as part of their SAP license, except non-SAP DB-usage
  - SLAs requiring fixed reserved processor capacity can have the applications still share resources..

In this example, 8 licenses for DB would be required and 8 licenses for "other apps"
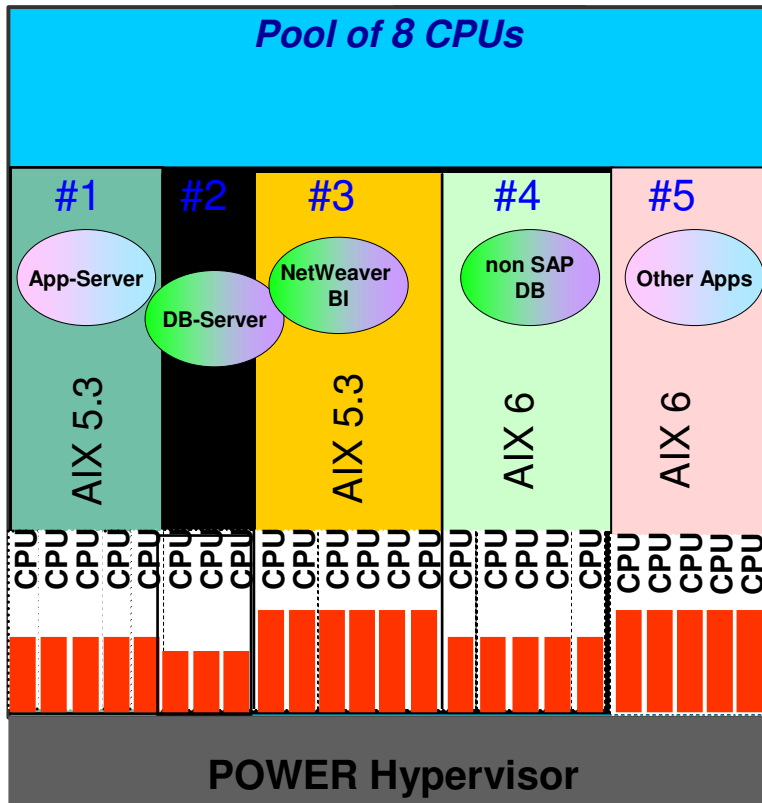
In this example, only 2+4 licenses for DB would be required and only 2 licenses for "other apps"
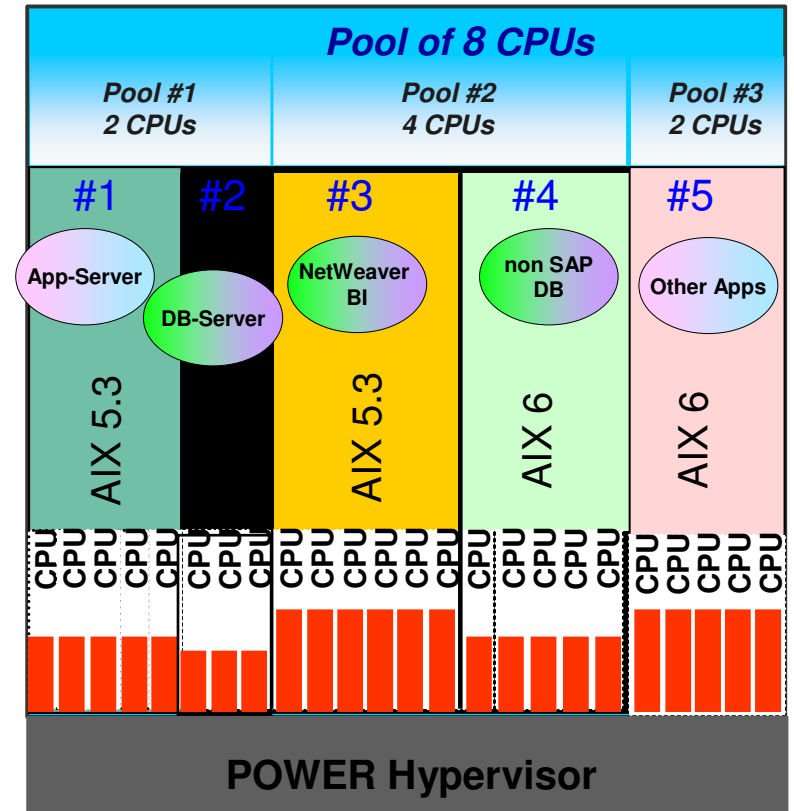
IBM SAP Customer experiences
SAP Systems in a Customer Datacenter on a virtualized IBM POWER5 Environment

- Large European Bank
- 62 SAP "systems" + HA
- Classic sizing = 189 CPUs
- Virtualized = 48 CPUs

- Consolidated to 4 p570 systems using Shared Processor LPARs and MicroPartitioning

- One system ran 21 LPARS, peak usage, 11.5 physical CPUs
- Another ran 18 LPARS, peak usage 11.7 physical CPUS

shared instances ~ 60% avg. util

Isolated instance < 20% avg. util
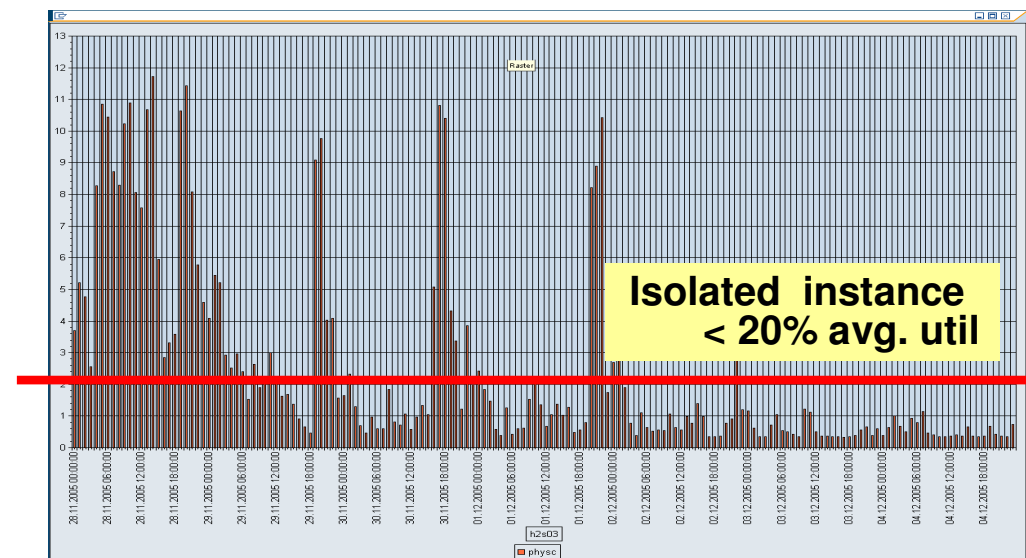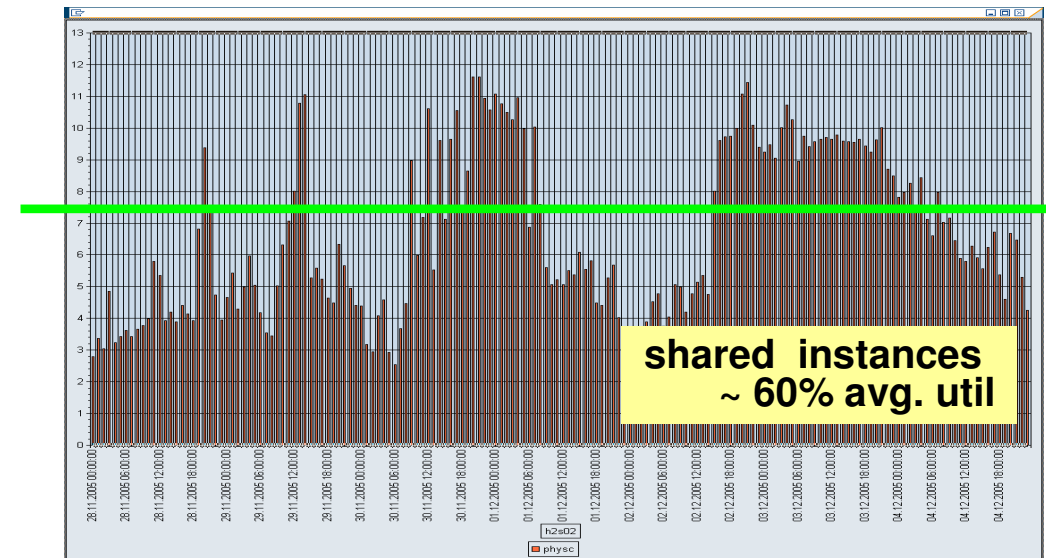
Resource synergies from real customer cases
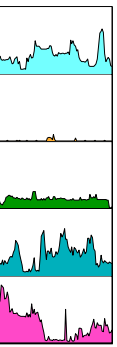
Classical Setup	
CPUs	**Memory**
58	450 GB
75	600 GB
n/a	n/a
100	800 GB
189	1.5 TB
95	760 GB
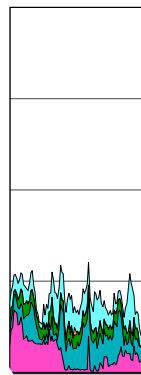
Intelligent Virtualization	
P5 cores	**Memory**
26	256 GB
32	300 GB
64	512 GB
32	320 GB
48	672 GB
60	256 GB

CPU capacity real vs. Quicksizer required	Memory real / rule of thumb (GB/core)	# of LPARs *)
cores	Memory	#
0,45	0,57	33
0,43	0,5	34
n/a	n/a	15
0,32	0,4	56
0,25	0,45	88
0,63	0,34	6

Migration / hw upgrade

Existing/sized landscape

Real Power System servers

*) 1 application per LPAR plus VIO server

Potential real memory savings by AME for SAP customers
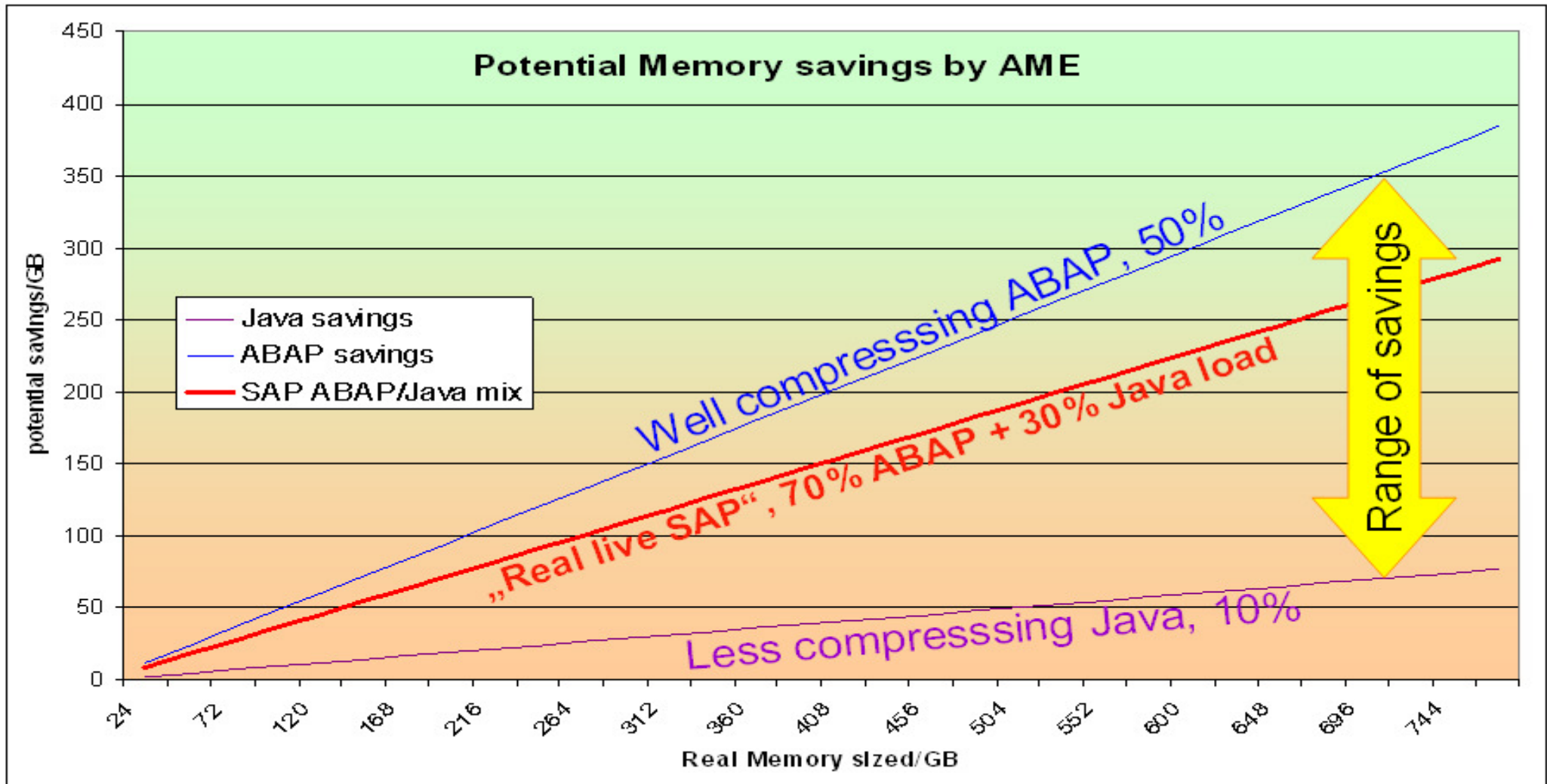
- Real live memory gains by SAP implementations depend on the workload mix
- Using 16GB DIMMs there is a break-even from a pricing perspective at:
  - **Power 750 ~12GB of real memory savings**   **Power 770 ~20GB of real memory savings**
    (FC 4528 = 32GB = 2*16GB DIMMs)   (FC 5601 = 64GB = 4*16GB DIMMS)

POWER7 continues to deliver more
Performance per Watt

✓ 30X increase in performance per watt
✓ 26X increase in rPerf performance
✓ 3…4x increase of performance/Watt over PW6

Commercial performance / kWatt

POWER4™ p670	POWER4+™ p670	POWER5™ p5-570	POWER5+™ p570	POWER6™ Power 570	POWER6™ Power 570	POWER7™ Power 780
1.1 GHz	1.5 GHz	1.65 GHz	1.9 GHz	4.7 GHz	4.2 GHz	3.8 GHz
rPerf: 24.46	rPerf: 46.79	rPerf: 68.4	rPerf: 85.20	rPerf: 134.35	rPerf: 193.25	rPerf: 685.09
KWatts: 6.71	KWatts: 6.71	KWatts: 5.2	KWatts: 5.2	KWatts: 5.6	KWatts: 5.6	KWatts: 6.4
3.64	6.97	13.15	16.38	23.99	34.56	107.04

POWER7 based systems have 3 to >5 times the energy efficiency as POWER6 based systems

Performance per WATT based on SPECint_rate2006 results as of February 18, 2010							
System Name	**Cores**	**Chips**	**Cores/ chip**	**Threads/ Core**	**Peak**	**WATTs**	**Peak / WATT**
IBM Power 780	64	8	8	4	2530	6400	**0.39**
IBM Power 595	64	32	2	2	2160	28300	**0.07**
IBM Power 770	64	8	8	4	2013	6400	**0.31**
IBM Power 570	16	8	2	2	542	5600	**0.09**
IBM Power 750 Express	32	4	8	4	1060	1950	**0.54**
IBM Power 560 Express	16	8	2	2	363	2400	**0.15**
IBM Power 550 Express	8	4	2	2	263	1400	**0.18**

See slide "Energy Efficiency Substantiation" for sources and additional detail

Virtualization helps reduce IT ecosystem power requirements
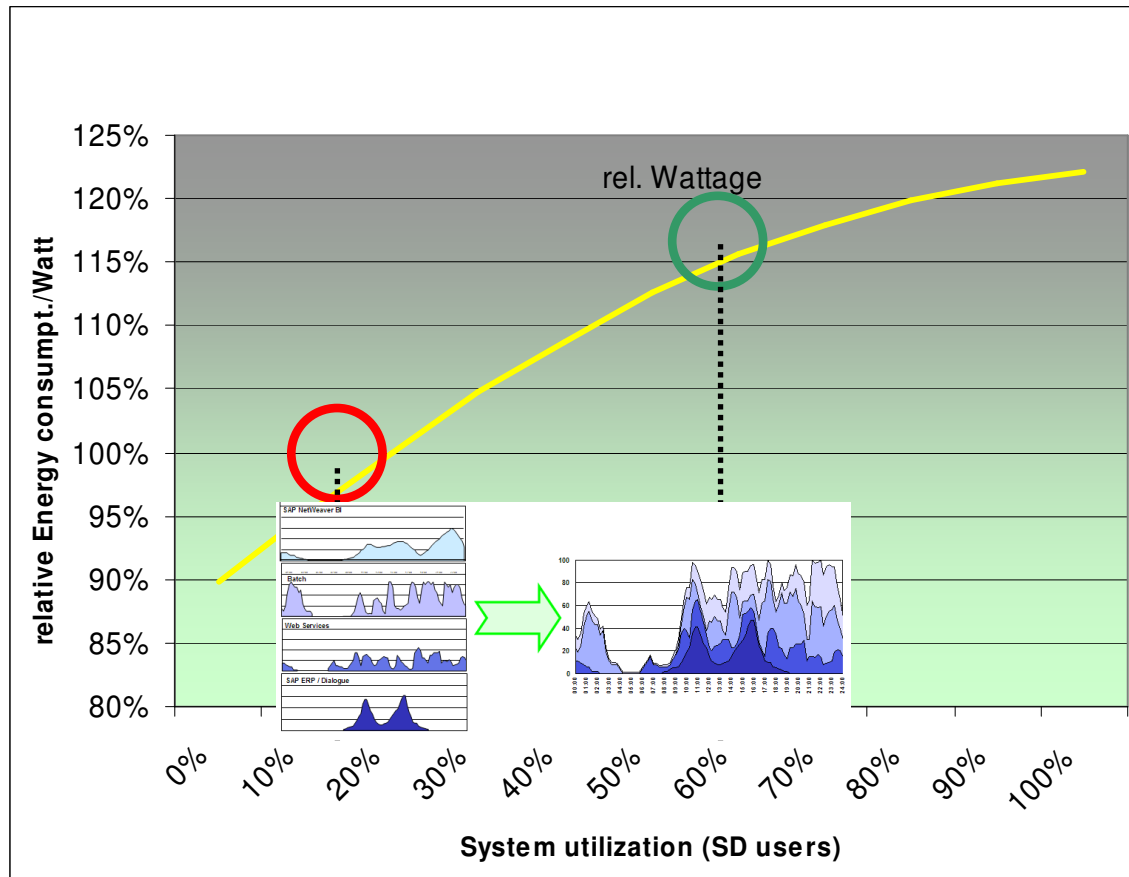
- Normalization point is 20% utilization of an SAP-Server (=100% energy reference point)

- Increasing system utilization to 60% means about 3x transactions or active users.

- Incremental wattage is only 16%! while gaining 3x power efficiency.

- **This behavior shows that Green IT comes along with consolidation and virtualization of applications.**
  - Why? - Raising utilization by a factor of 3 just requires about 16% more energy.

Customer benefits of Intelligent Energy Management

Relative energy consumption per identical SAP transaction throughput
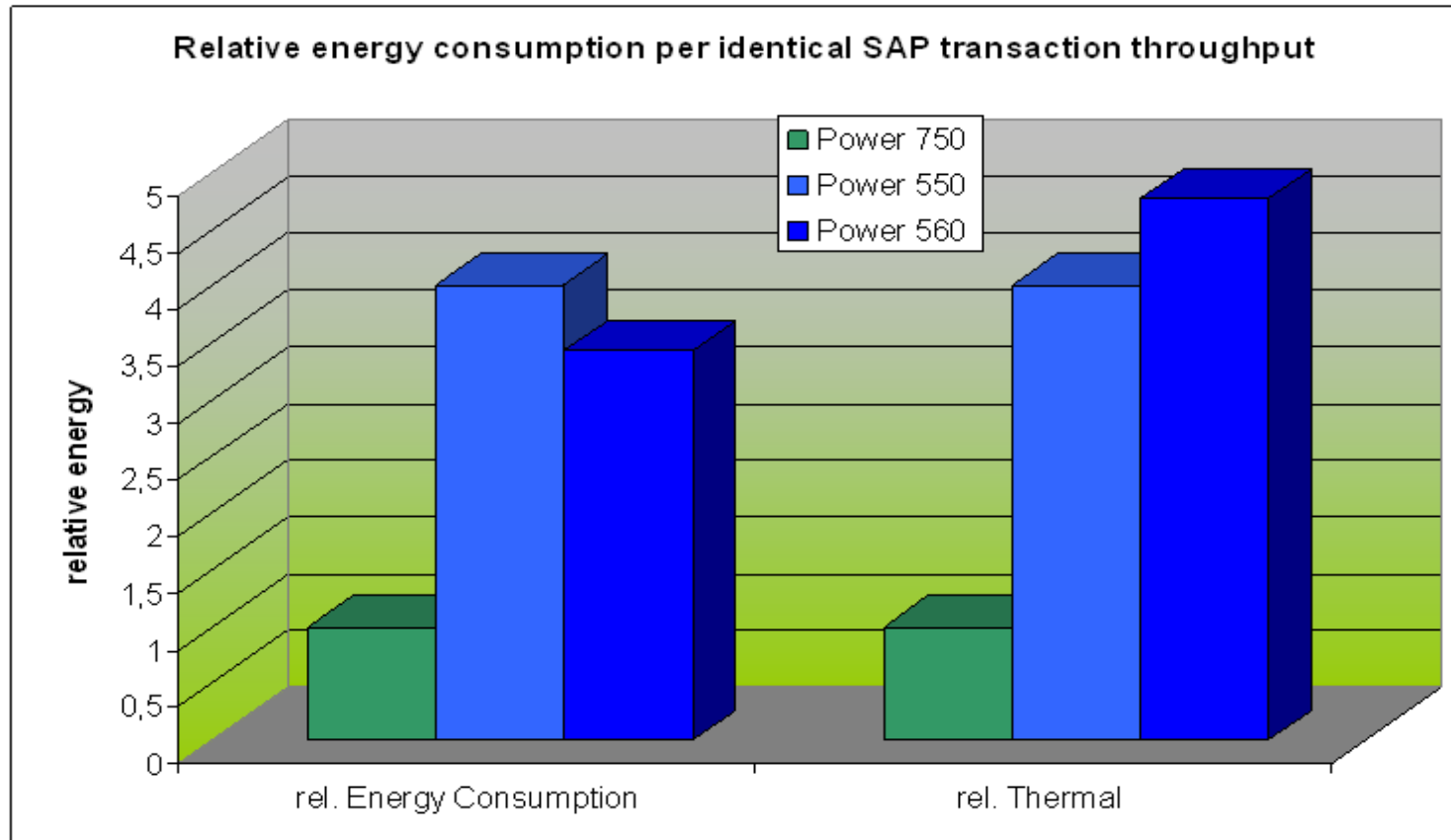
- Significant space and energy savings for POWER7 based infrastructures
- Less cooling, lower CO_2-Emission
- SAP has released „SAP Power Benchmarks"
    - a) Server only (GA 11/09)
    - b) System landscape (under definition)
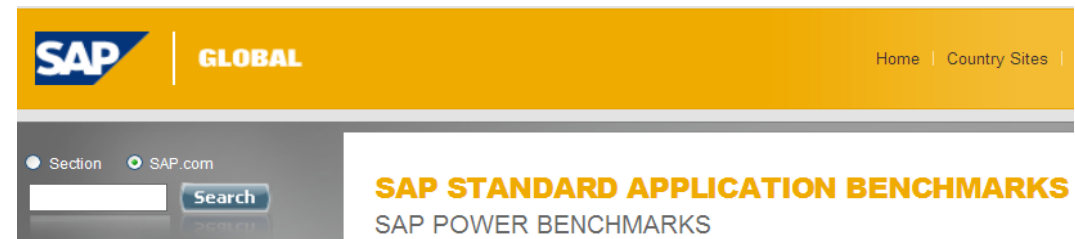
Agenda

- IBM Power System™ News

- Principles of POWER™ virtualization

- Benefits of POWER for SAP landscapes

- **AIX for SAP Business Applications**

- Systems Management
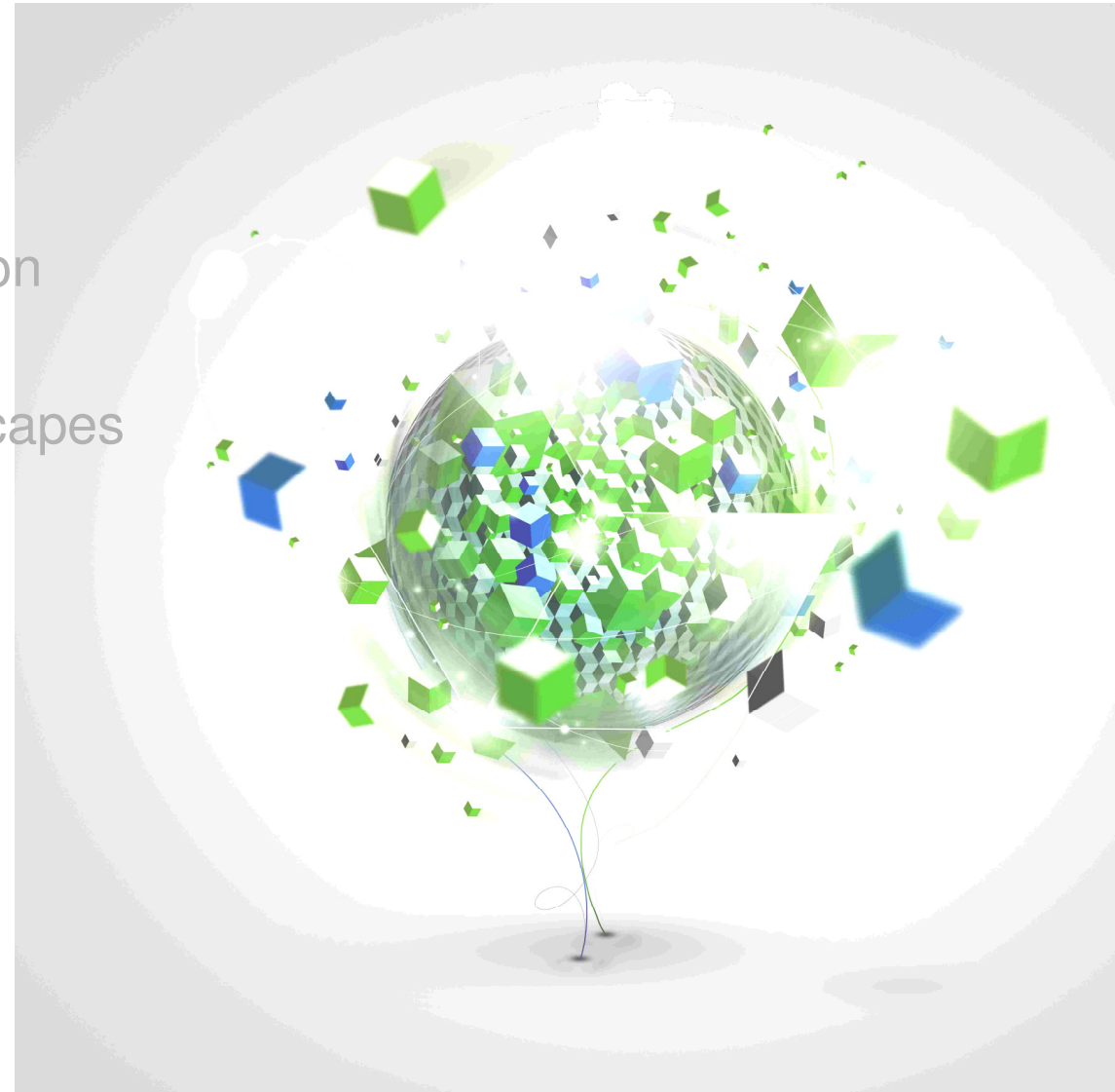
AIX® supports virtualization and improved management

AIX 6

Go Green & Save

- Workload Partitions
- Live Application Mobility
- Partition Mobility
- Workload Partitions Manager for AIX

Manage Growth, Complexity & Risk

- Workload Partitions
- AIX Security Expert
- Role Based Access Control
- Encrypting Filesystem
- Binary Compatibility Guarantee*

Realize Innovation

- Workload Partitions
- Live Application Mobility
- Concurrent Kernel Updates
- Continuous Availability features

*Details at ibm.com/systems/p/os/aix/compatibility

2009 – 2011 AIX TL Roadmap

10/2009   04/2010   10/2010   04/2011   10/2011

POWER7 Hardware Support

AIX 5.3

TL8
TL9
TL10
TL11
TL12

AIX 6.1

TL1
TL2
TL3
TL4
TL5
TL6
TL7
TL8
TL0
TL1
AIX 7.1
TL2

SP

**Service Pack
POWER7 Support**

   ISICC Walldorf - MK, 09/2010   © 2010 IBM Corporation
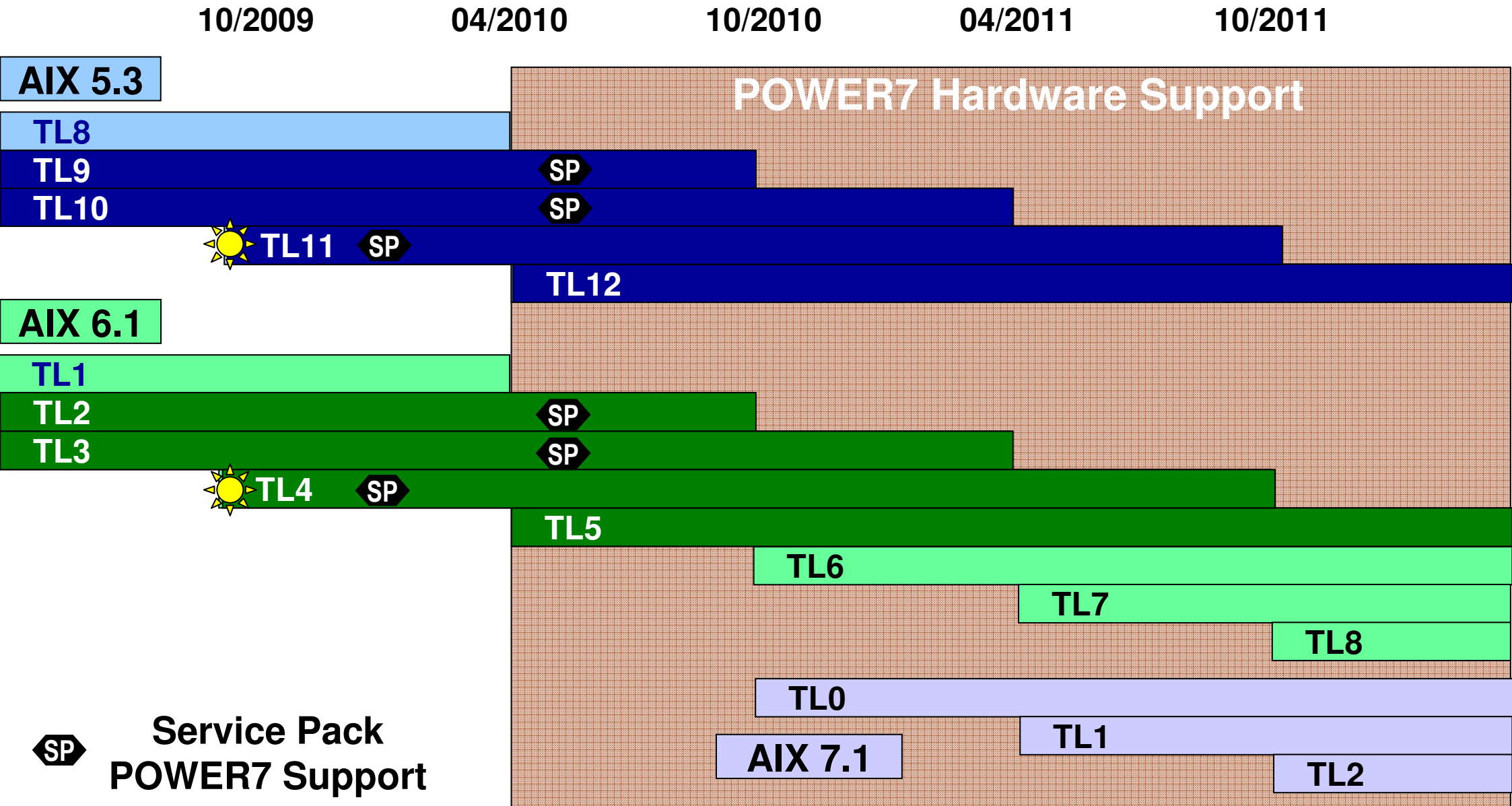
POWER7 Binary Compatibility Statement

POWER7 supports your applications

Dear Power Systems client:

We listened, we have delivered for you, and in fact we hope you have been ecstatic with the recent announcements on the POWER7™ products. We have worked hard to design a system that not only performs well but is easy to implement.

The new POWER7 servers run the AIX® V5.3 and AIX V6.1 operating systems, with binary compatibility for applications currently running on previous AIX versions on POWER4 or later. POWER7 systems also run the IBM i 6.1 operating system, with binary compatibility for IBM i applications on previous releases, even applications supported in S/36 and S/38 environments. In addition, POWER7 systems support Novell's SUSE Linux Enterprise Server SLES 10 SP3 and SLES 11 with binary compatibility for those releases running on POWER6 systems. Further, Red Hat intends to support POWER7 systems with a future release of RHEL in the first half of 2010. This broad support for multiple operating systems at announce is one of the strongest that we have ever had.

But some clients have said that they want to hear it from me. I want to assure you that we are committed to the binary compatibility of POWER7 with the AIX, IBM i and Linux operating systems. We've said we have binary compatibility and we mean it.

Supported SW-Levels

- AIX 5.3 with the 5300-11 Technology Level and SP2, or later
- AIX 6.1 with the 6100-04 Technology Level and SP3, or later

- IBM i 6.1 with 6.1.1 machine code, or later
- IBM i 7.1 plan mid 2010

- SUSE Linux Enterprise Server 10 with SP3 for POWER
- SUSE Linux Enterprise Server 11 for POWER, or later
- RHEL (5.5) SoD

- VIOS 2.1.2.12 with Fix Pack 22.1 and Service Pack 2, or later

- AIX 7 – to become available in late 2010 – is NOT required for current PW7 systems
  - Will become important for high-end systems
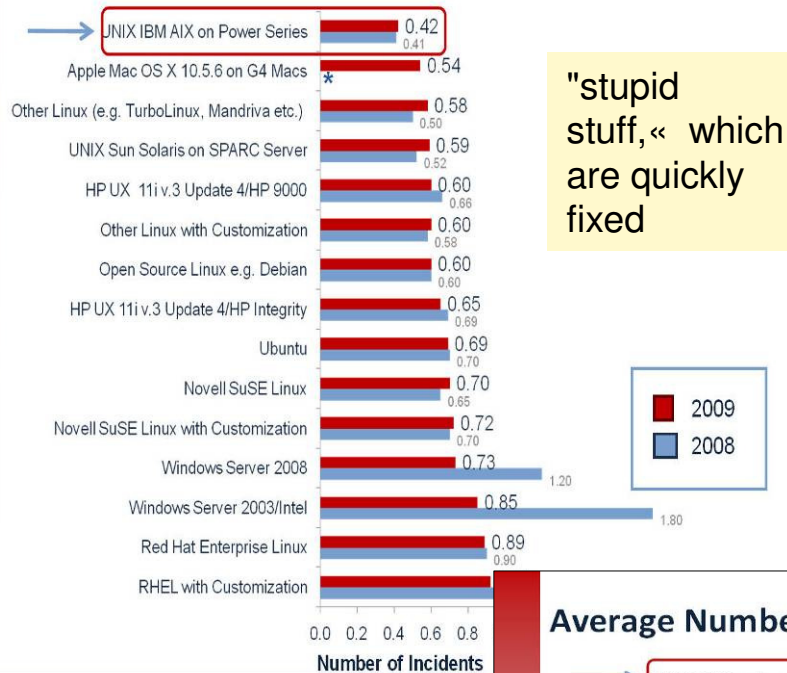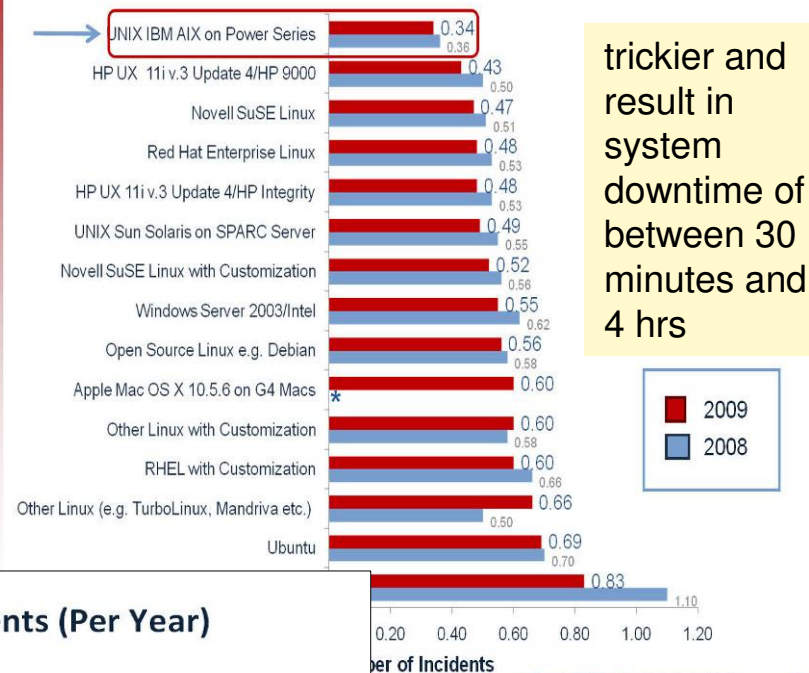
AIX - most reliable OS for mission critical SAP Apps

IBM

Average Number of Tier 1 Incidents (Per Year)

OS	2009	2008
UNIX IBM AIX on Power Series	0.42	0.41
Apple Mac OS X 10.5.6 on G4 Macs *	0.54	
Other Linux (e.g. TurboLinux, Mandriva etc.)	0.58	0.50
UNIX Sun Solaris on SPARC Server	0.59	0.52
HP UX 11i v.3 Update 4/HP 9000	0.60	0.66
Other Linux with Customization	0.60	0.58
Open Source Linux e.g. Debian	0.60	0.60
HP UX 11i v.3 Update 4/HP Integrity	0.65	0.69
Ubuntu	0.69	0.70
Novell SuSE Linux	0.70	0.65
Novell SuSE Linux with Customization	0.72	0.70
Windows Server 2008	0.73	1.20
Windows Server 2003/Intel	0.85	1.80
Red Hat Enterprise Linux	0.89	0.90
RHEL with Customization		

Number of Incidents 0.0 0.2 0.4 0.6 0.8

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"stupid stuff,« which are quickly fixed

Average Number of Tier 2 Incidents (Per Year)

OS	2009	2008
UNIX IBM AIX on Power Series	0.34	0.36
HP UX 11i v.3 Update 4/HP 9000	0.43	0.50
Novell SuSE Linux	0.47	0.51
Red Hat Enterprise Linux	0.48	0.53
HP UX 11i v.3 Update 4/HP Integrity	0.48	0.53
UNIX Sun Solaris on SPARC Server	0.49	0.55
Novell SuSE Linux with Customization	0.52	0.56
Windows Server 2003/Intel	0.55	0.62
Open Source Linux e.g. Debian	0.56	0.58
Apple Mac OS X 10.5.6 on G4 Macs *	0.60	
Other Linux with Customization	0.60	0.58
RHEL with Customization	0.60	0.66
Other Linux (e.g. TurboLinux, Mandriva etc.)	0.66	0.50
Ubuntu	0.69	0.70
	0.83	1.10

Number of Incidents 0.20 0.40 0.60 0.80 1.00 1.20

* Apple MAC OS not included in the survey for 2008

trickier and result in system downtime of between 30 minutes and 4 hrs

Average Number of Tier 3 Incidents (Per Year)

OS	2009	2008
UNIX IBM AIX on Power Series	0.00	0.41
HP UX 11i v.3 Update 4/HP 9000	0.10	0.66
UNIX Sun Solaris on SPARC Server	0.10	0.52
Other Linux with Customization	0.12	0.58
HP UX 11i v.3 Update 4/HP Integrity	0.14	0.69
Novell SuSE Linux	0.19	0.25
Apple Mac OS X 10.5.6 on G4 Macs *	0.20	
Red Hat Enterprise Linux	0.20	0.10
Ubuntu	0.23	0.70
Novell SuSE Linux with Customization	0.25	0.33
Other Linux (e.g. TurboLinux, Mandriva etc.)	0.27	0.50
Windows Server 2008	0.39	0.57
Windows Server 2003/Intel	0.40	0.59
Open Source Linux e.g. Debian	0.44	0.41
RHEL with Customization	1.44	0.10

Number of Incidents 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

* Apple MAC OS not included in the survey for 2008
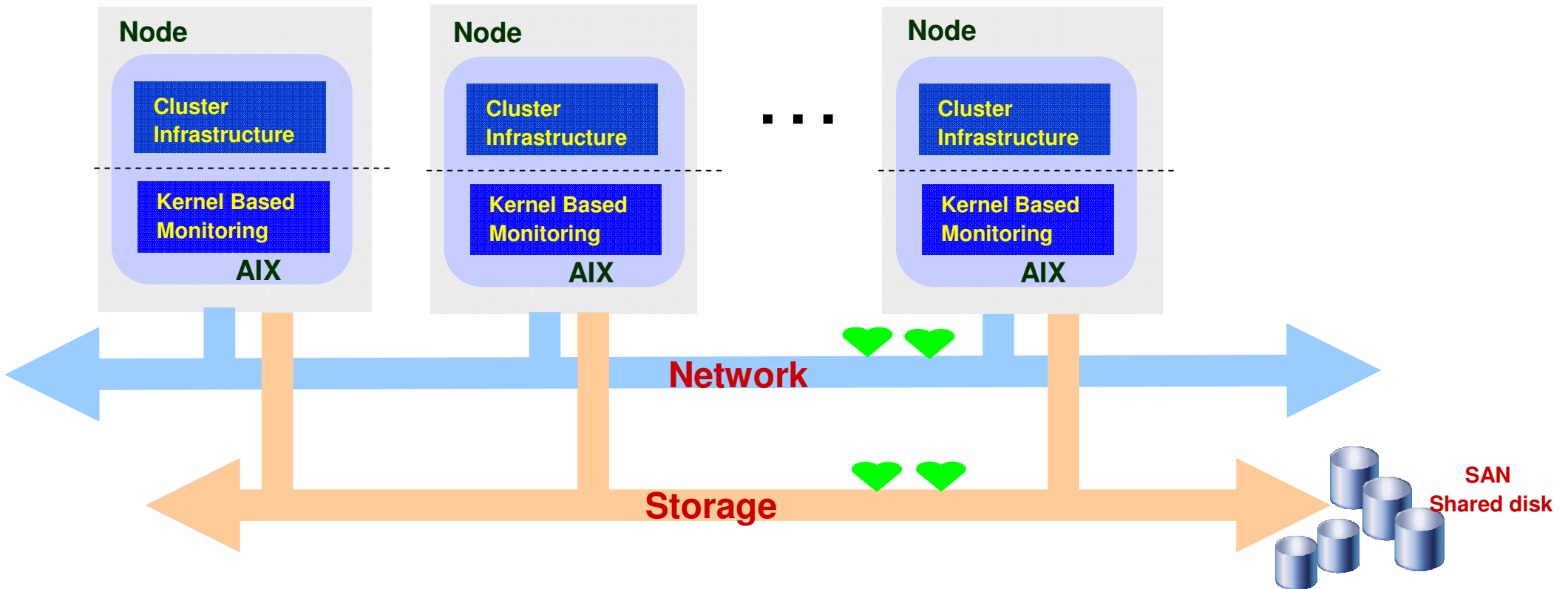
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the worst, and most rare outages. can span more than one box
take more than 4 hrs to resolve. can result in lost data and usually impact end users

AIX 7 is becoming Cluster Awareness

Reliable Health Monitoring

Cluster Wide Event Management

Cluster Wide AIX Command Operations

Cluster Wide Device Name Virtualization

Quorum Server, Reliable Messaging

Integration of classical PowerHA technology & functions into AIX 7 ff

Node
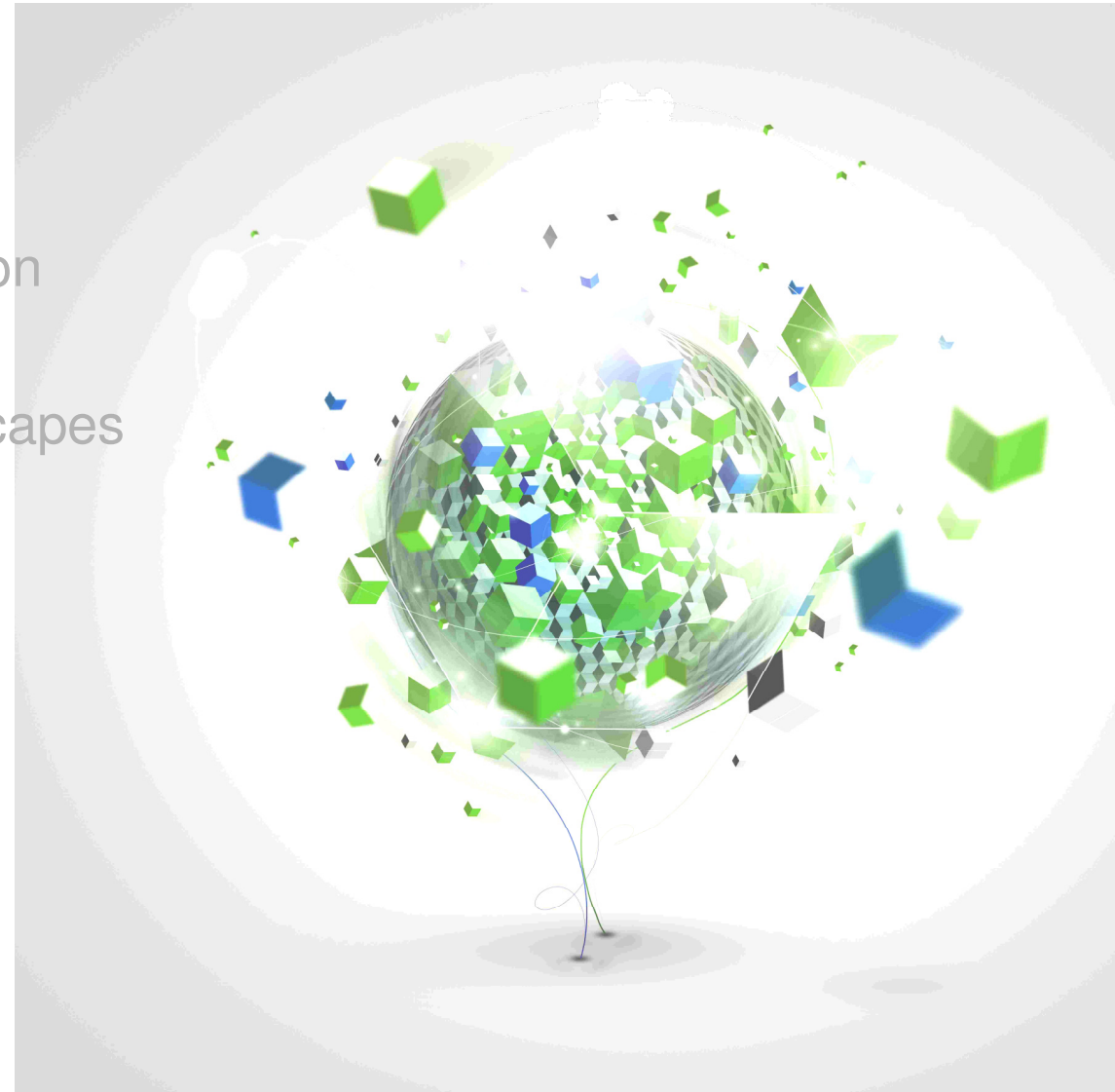
Cluster Infrastructure

Kernel Based Monitoring

AIX

Node

Cluster Infrastructure

Kernel Based Monitoring

AIX

. . .

Node

Cluster Infrastructure

Kernel Based Monitoring

AIX

Network

Storage

SAN Shared disk

PowerHA Best Practices WIKI established in 2009

- Link at ISICC-WIKI http://w3.tap.ibm.com/w3ki2/display/isicc/PowerHA+Best+Practices
- Co-Authors and contributors welcome
    - could be established as central SAP with PowerHA repository
- Plan to post content to a public WIKI in late 2010

Agenda

- IBM Power System™ News

- Principles of POWER™ virtualization

- Benefits of POWER for SAP landscapes

- AIX for SAP Business Applications

- **Systems Management**

IBM Systems Director provides a cross-platform management tool

AIX Administrator

Windows Administrator

zLinux Administrator

IBM i Administrator

IBM® Systems Director

Microsoft Windows™

Linux

AIX

VM

PowerVM™

Linux

VMware ESX™

VM

Linux

VM

z/VM

for Business

for Business

VM

PowerVM™

VIO   VIO

# System Director helps to maintain (Power) System availability

- **Basic system monitoring**
  - Use one console for server, network and energy status
  - Monitor physical and virtual servers, networks and energy
  - Customize at-a-glance health status
- **Proactive alerts**
  - Set thresholds to identify performance problems
  - Set thresholds to identify hot-spots in or around servers
  - Get alerts sent to e-mail or pager
- **System pool monitoring**
  - Monitor status of system pools as a single system
  - Monitor workload status
  - View resource utilization of the system pool
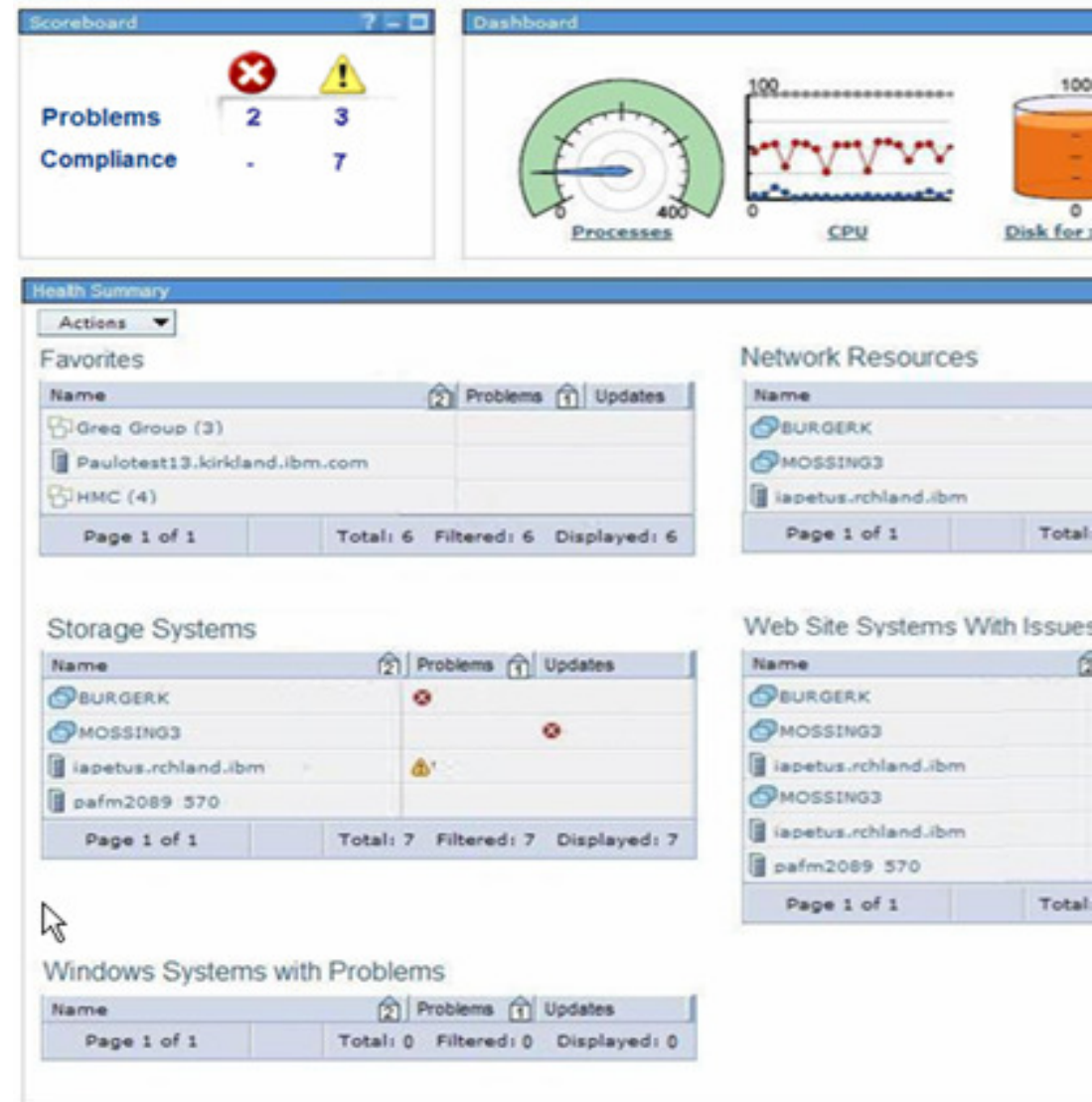
Determine the root cause of problems more quickly

- At-a-glance status
  - View server and component status
  - View workload status in system pools
- Visual Correlation
  - View relationships of network devices and servers
  - Associate servers with air conditioning units
- Root cause analysis
  - ❖ Identify system changes
  - ❖ Analyze real-time data with historical performance
 - Trace problems with topology maps
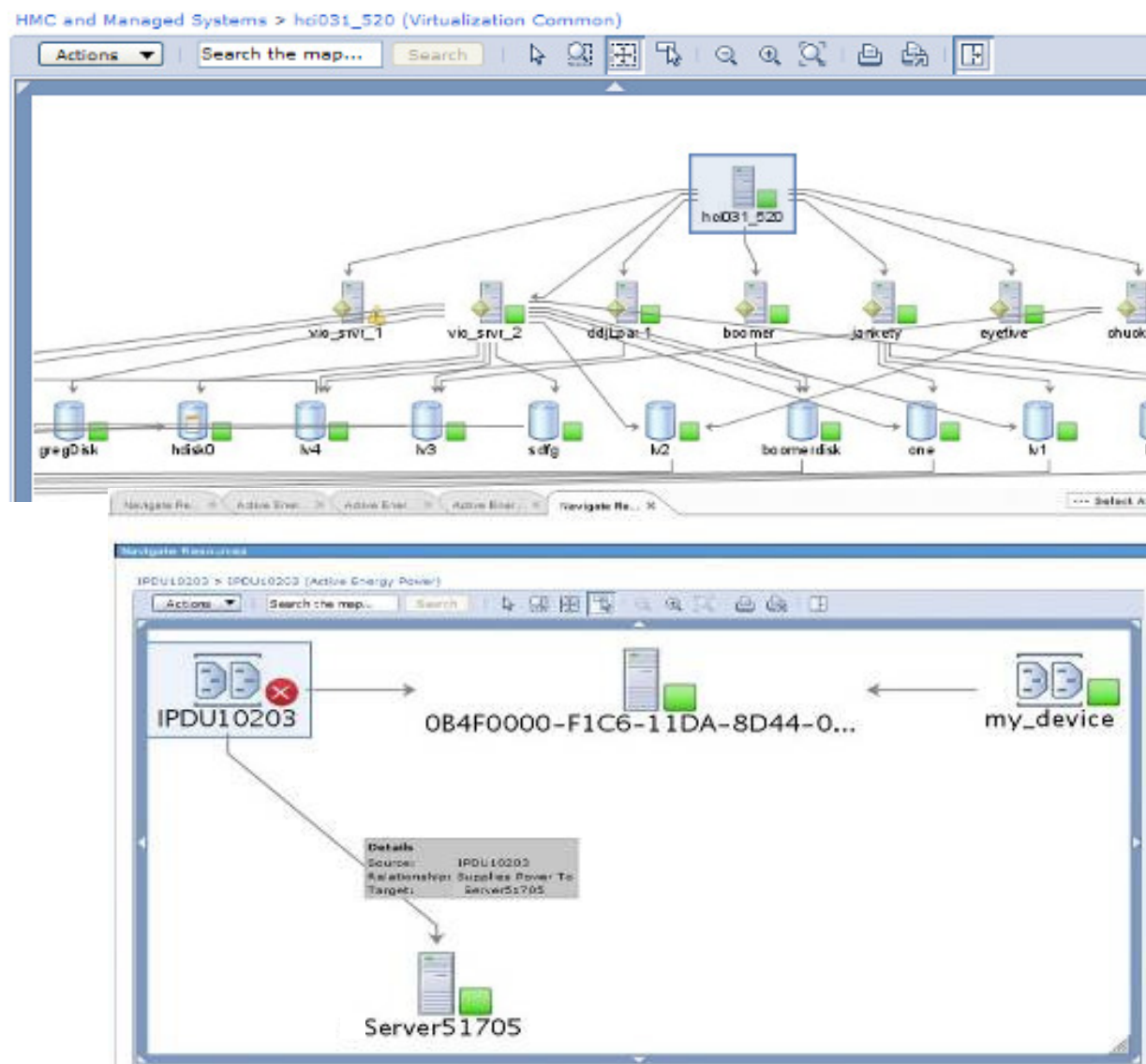
❖   Feature delivered by **Tivoli.** oftware

IBM Systems Director Active Energy Manager

- Next generation of IBM Power Executive
  - Measures, monitors, and manages the energy management components built into IBM systems
  - Provides energy management data that can be exploited by IBM Tivoli Monitoring and Usage and Accounting Manager
- Monitor intelligent Power Distribution Units (iPDUs)
  - Allow management of legacy systems
  - Display trending information per load group
- Exploit Energy Scale™ capabilities of POWER6 servers
  - Power and thermal trending
  - Power saving
  - Power capping
- Experiences with SAP application behavior

SAP Adaptive Computing Controller 7.20 supports virtualized (Power) Systems management
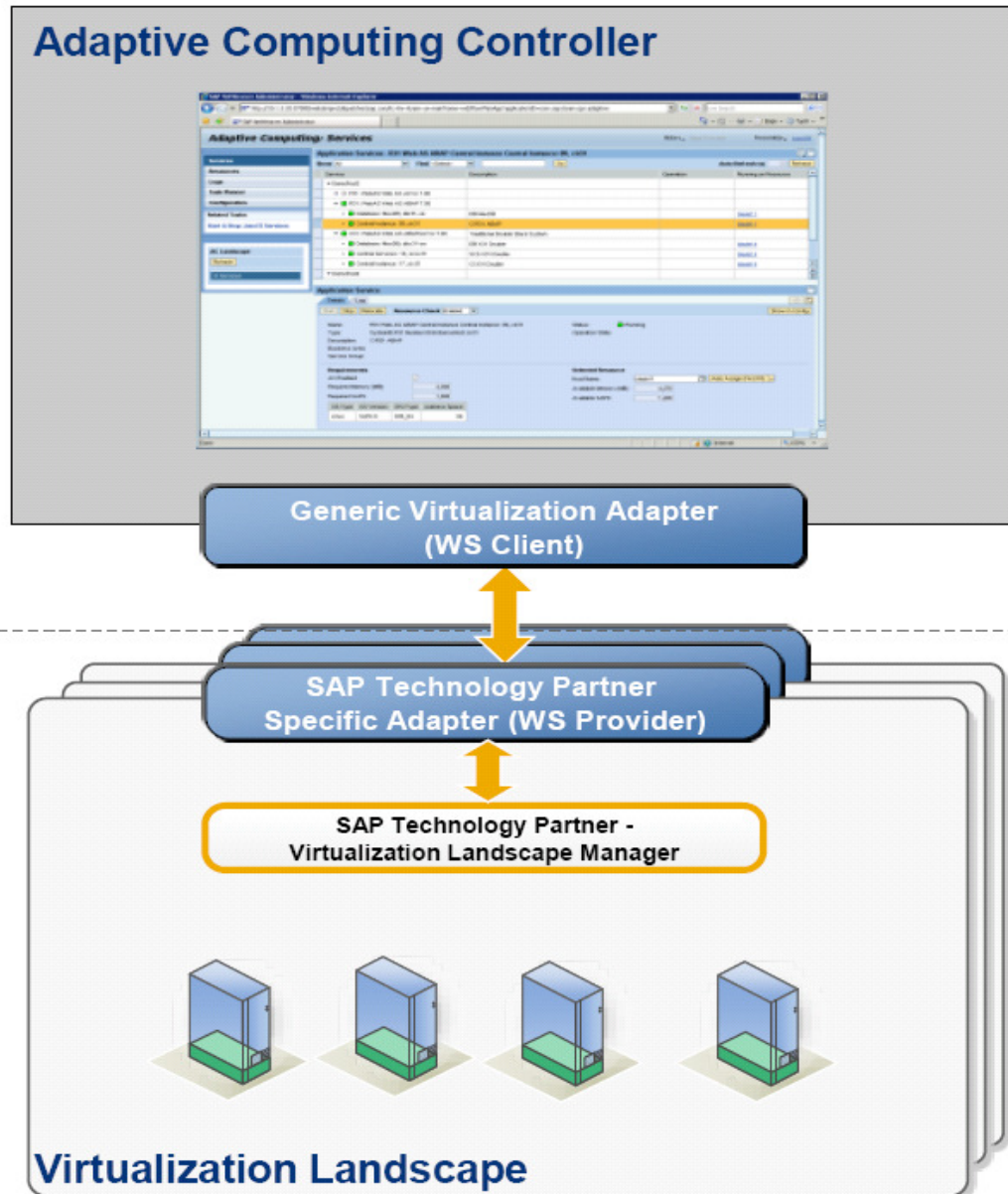
- SAP ACC has been enabled to also manage virtualized subsets of physical servers, including PowerVM shared LPARs, and Live Partition Mobility.
  - In Ramp-Up since 12/09
  - Planned GA mid 2010

- This is a step towards the cloud-like administration of IBM Power platforms by SAP administration tools. SAP business applications support "private clouds", which today typically are implemented in form of classical virtualization technologies like PowerVM.

- New features becoming available to customers with SAP ACC 7.20 include:
  - Start/stop/shutdown/reboot of LPARs
  - Initiating a non-disruptive POWER Live Partition Migration (LPM) from one server to another. This is in contrast to the
  - disruptive relocation of SAP instances by standard ACC means.
  - With LPM support also VIO-attached LPARs can be moved (vs. prior NFS + GPFS only).
  - Show integrated topology views of physical systems, virtual systems, and the SAP instances linked to those

POWER7 Technology Value for SAP Applications…

- **Technology**
  - Roadmap
  - Processor Leadership
  - Green Technology built in
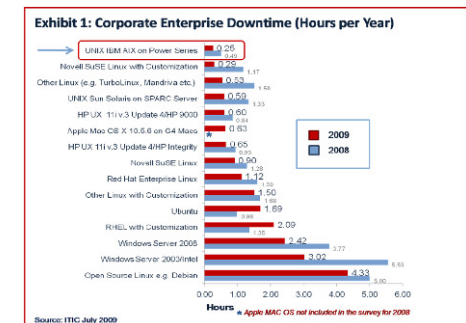 - Common architecture from Blades to High-end

- **Performance**
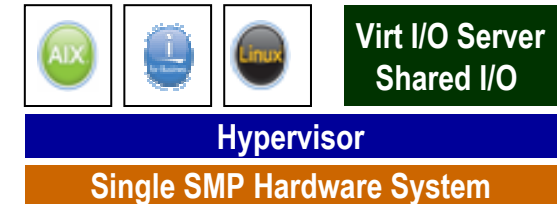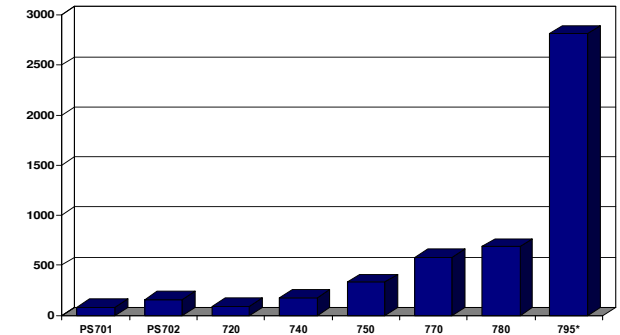 - Power Systems scalability
  - Performance leadership in a variety of workloads
  - Best per core / per system performance
  - Memory and IO bandwidth

- **Virtualization**
  - Consolidate to higher levels
  - Virtualize Processors, Memory, and I/O
  - Dynamic movement of Partitions and Applications
  - Reduce infrastructure costs

- **RAS**
  - Power Systems mainframe inspired RAS features
  - Hot Add support / Hot Maintenance
  - Alternate Processor Recovery
  - Operating Systems Availability Leadership

POWER4 180 nm

POWER5 130 nm

POWER6 65 nm

POWER7 45 nm

POWER8 22 nm

AIX | i for Business | Linux

Virt I/O Server Shared I/O

Hypervisor

Single SMP Hardware System

PowerVM

Exhibit 1: Corporate Enterprise Downtime (Hours per Year)
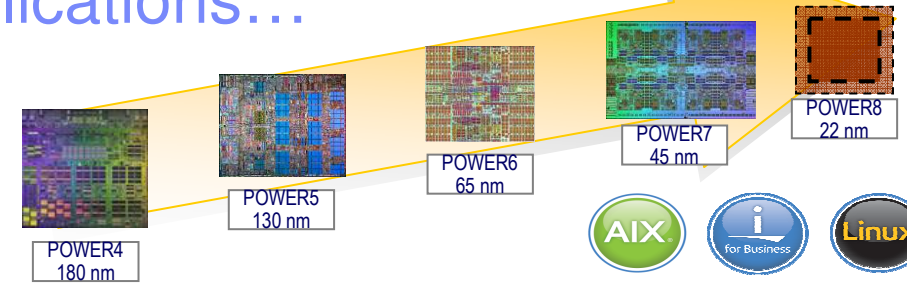
Conclusion – Why Power Systems for SAP?

- TCO

- Risk

- Unplanned outage avoidance

- Planned outage avoidance

- Operations simplification

- SAP landscapes often have large # of instances both prod & non-prod

- SAP migrations are disruptive, expensive

- Business critical nature of SAP, even BI and SCM mean that outages can result in huge business cost

- Multiple shifts, batch workloads and/or global single instance mean that systems operate 24/7/365

- Personnel and facilities often cost 3 to 4 times the cost of the server hardware, skilled employees increasingly hard to find

- Leadership performance per core, virtualization + reduced middleware costs when priced per core

- Minimized due to solid product roadmaps, leadership and growing marketshare

- Mainframe inherited HW features protect against memory, cpu, I/O failures, z/OS inherited SW features protect against misbehaving applications and device drivers

- Dynamic firmware and OS kernel updates, Live Partition Mobility

- Virtualization reduces number of I/O cards, cabling, numbers of systems, allows for aggregate monitoring, capacity planning, rapid response to changing business demands

Power your planet.
Smarter systems for a Smarter Planet.

Performance that delivers business advantage

Workload-Optimizing Systems

Intelligent Energy Optimization

Ease of Ownership

Consolidation with Exponential ROI

ISICC Walldorf - MK, 09/2010   © 2010 IBM Corporation

Time for Questions …

Mail contact: isicc@de.ibm.com

POWER(7)/SAP Resources of Interest

Document Title	ibm.com Link	w3 internal Link	PartnerWorld Link
Active Memory Sharing Overview whitepaper	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_PO_PO_USEN&htmlfid=POW03025USEN&attachment=POW03025USEN.PDF	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGI_PO_PO_USEN&htmlfid=POW03025USEN&attachment=POW03025USEN.PDF	http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/POW03025USEN
Active Memory Sharing Performance whitepaper	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_PO_PO_USEN&htmlfid=POW03017USEN&attachment=POW03017USEN.PDF	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGI_PO_PO_USEN&htmlfid=POW03017USEN&attachment=POW03017USEN.PDF	http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/POW03017USEN
Power Systems Performance Report	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=PM&subtype=RG&attachment=POO03014USEN.PDF&appname=STGE_PO_PO_USEN&htmlfid=POO03014USEN	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=PM&subtype=RG&attachment=POO03014USEN.PDF&appname=STGI_PO_PO_USEN&htmlfid=POO03014USEN	http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/POO03014USEN
The Benchmark Index		http://w3.ibm.com/sales/support/ShowDoc.wss?docid=V223195B30125A69&infotype=SK&infosubtype=P0&node=doctype,P0|doctype,CSR|doctype,PBN||clientset,IA|geography,EW|industries,&appname=CC_CFSS	http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/esbmi
A Comparison of PowerVM and x86-Based Virtualization Performance	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_PO_PO_USEN&htmlfid=POW03029USEN&attachment=POW03029USEN.PDF		
IBM Sets Pace in Unix Virtualization (analyst)	http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_PO_PO_USEN&htmlfid=POL03064USEN&attachment=POL03064USEN.PDF	http://w3.ibm.com/sales/support/ShowDoc.wss?docid=POL03064USEN&infotype=SA&infosubtype=WH&node=brands,B5000|clientset,IA|doctype,P0|doctype,OPR&appname=CC_CFFRF	http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/POL03064USEN
Power Systems Master Sales Kit		http://w3.ibm.com/sales/support/ShowDoc.wss?docid=M241750O50193N08&infotype=SK&infosubtype=S0&node=&ftext=ibm%20power%20systems%20master%20sales%20kit&hitsize=&sort=recommended&showDetails=&offset=0&campaign=	http://www.ibm.com/partnerworld/wps/servlet/ContentHandler/PSmk.skit

SAP on IBM POWER documents

- IBM internal competitive + reference materials available as a Cattail Collection:
  - http://cattail.boulder.ibm.com/cattail/#view=collections/C64753E05C0C3DDA93486644093F23B6
- Comfortable Video-Demo available at TechDocs (includes PW & www):
  - ***POWER6 Live Partition Mobility Demo with SAP***
  - http://w3.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS2921
  - **Integration of IBM *PowerVM and SAP Adaptive Computing Controller + CCMS***
  - http://w3.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS2xxxx
- Whitepaper available on SAP Developer Network (SDN)
  - ***Live Migration of Power Partitions running SAP Applications***
  - https://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/webcontent/uuid/b0b6911f-bf10-2c10-14ba-bc789953ff25
- Redbook published in 2008
  - ***SAP Applications on PowerVM***
  - http://www.redbooks.ibm.com/redbooks/pdfs/sg247564.pdf
- ITG VALUE PROPOSITION FOR IBM POWER SYSTEMS
  - ***Platform Choices for the Enterprise SAP Infrastructure***
  - http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_PO_PO_USEN&htmlfid=POL03021USEN&attachment=POL03021USEN.PDF
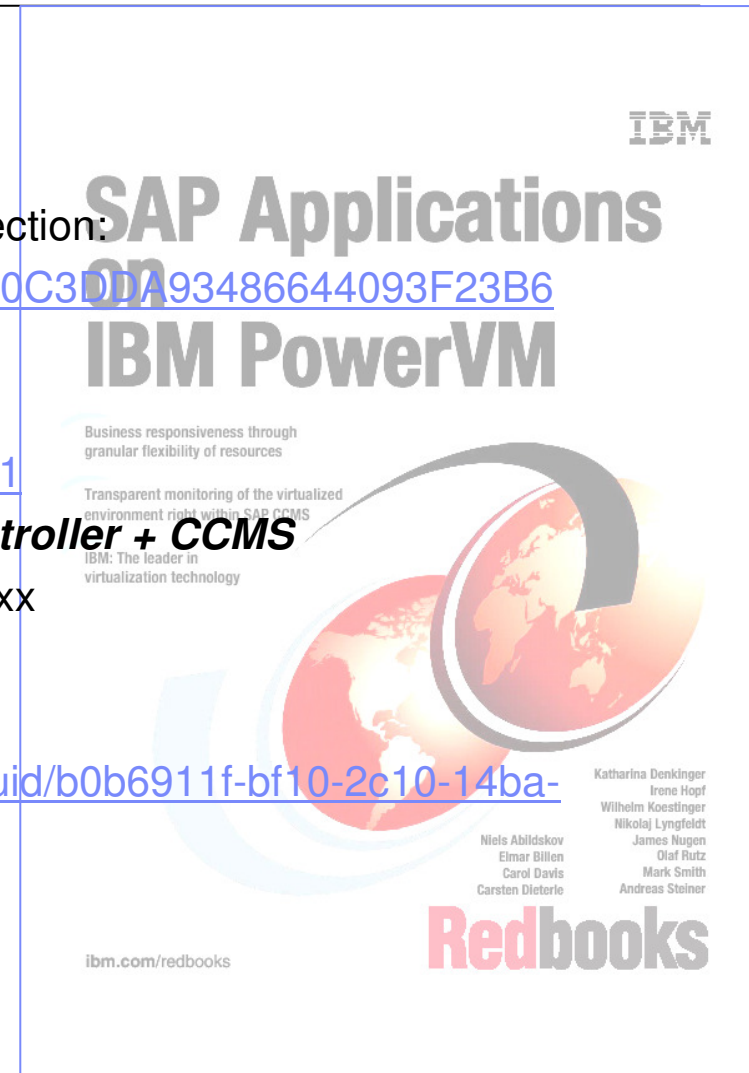
Power vs Competitive x86 Materials & Education

▪ Power Systems with POWER7: Competitive Positioning Webcast & Presentation on Systems College:

   http://www-304.ibm.com/services/weblectures/dlv/Gate.wss?handler=Login&sequence=1&action=index&customer=partnerworld&offering=caps&itemCode=&category=&curriculum=&embed=yes&tab=&subtab=&clientjs=

▪ This sales presentation helps you win with existing Power customers running back-end databases on AIX, i or Linux and running, or thinking of running front-end applications on competitive scale-out servers.

   https://www-304.ibm.com/partnerworld/wps/servlet/mem/ContentHandler/PSCompetitivex86ServerTakeout

▪ This document is designed to help IBM Sellers and Business Partners find all marketing and sales collateral related to the Grow Your Power Base (HP/Sun/Dell x86 consolidation on Power) sales play.
   https://www-304.ibm.com/partnerworld/wps/servlet/mem/ContentHandler/PSGrowYourPowerBaseComptx86SCONAssets1203

▪ Win Against Oracle/Sun: Business Partner Resources and Eduations
   https://www-304.ibm.com/partnerworld/mem/sell/sel_sunora_over.html

ISICC Walldorf - MK, 09/2010

Public Power System AIX customer references and papers

- Open (double-click) embedded Excel to get customer list and links to PDF-brochures:
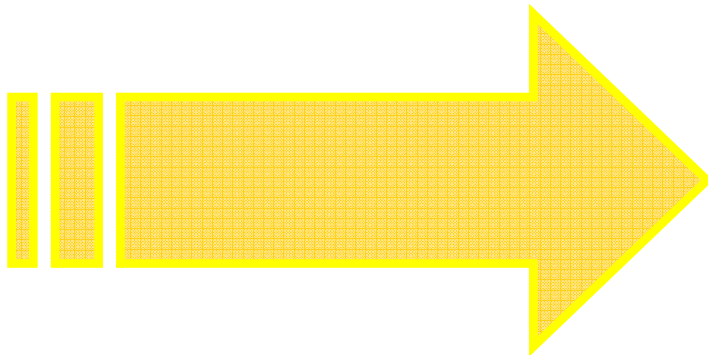
Customer	Reference	Case Stud
Achieving high volume rapid billing with SAP and IBM		http://www
Acquedotto Pugliese S.p.A.	http://w3-01.ibm.com/sales	
ADP (Aeroports de Paris)	http://w3-01.ibm.com/sales	
AFG Arbonia-Foster Holding AG	http://w3-01.ibm.com/sales	
AfriSam (Holcim Group)	http://w3-01.ibm	http://www
Agrium		http://www
Allianz Life Insurance Korea	http://w3-01.ibm.com/sales	
Alok	http://w3-01.ibm	http://www
Alpine Electronics	http://w3-01.ibm.com/sales	
Alstom		http://www
Amoi Electronics		http://www
Anonymous Case Study - Global Beauty Cosmetics Company		http://www
Antalis	http://w3-01.ibm.com/sales	
AOK Systems GmbH	http://w3-01.ibm.com/sales	
Arcelor Mittal	http://w3-01.ibm.com/sales	
ArcelorMittal Ostrava, a.s.		
ARAG	http://w3-01.ibm.com/sales	
ASM Brescia	http://w3-01.ibm.com/sales	
Audi Hungaria	http://w3-01.ibm	http://www
Austrian Railways	http://w3-01.ibm.com/sales	
B.Braun Laboritorios		http://www
Banca Nazionale del Lavoro, Gruppo BNP Paribas (BNL)	http://w3-01.ibm	http://www
Banco Bilbao Vizcaya Argentaria (BBVA)	http://w3-01.ibm.com/sales	
Banco Bradesco	http://w3-03.ibm.com/sales	
Bangchak Petroleum	http://w3-01.ibm	http://www
Bayer Business Services AG	http://w3-01.ibm	http://www
BeiQi Foton Motor Co. Ltd.	http://w3-01.ibm.com/sales	
Borcelik	http://w3-01.ibm	http://www
Brakes India Ltd.	http://w3-01.ibm	http://www
Britannia Industries		http://www
Brose Fahrzeugteile GmbH & Co.	http://w3-01.ibm.com/sales	
Bundeswehr	http://w3-01.ibm	http://w3-0
Cadbury Adams Brazil	http://w3-01.ibm.com/sales	
Cafam		http://www
CEMIG - Companhia Energética de Minas Gerais	http://w3-01.ibm.com/sales	
China Life Insurance Company	http://w3-01.ibm.com/sales	
Ciba Speciality Chemicals (Technical Paper)		http://www
City of Dortmund	http://w3-01.ibm.com/sales	
City of Dresden	http://w3-01.ibm.com/sales	
CLAAS		
Coca-Cola Bottling Company Consolidated	http://w3-01.ibm	http://www
Colgate - Palmolive	http://w3-01.ibm	http://www
Comune di Roma	http://w3-01.ibm	http://www
Consol Energy	http://w3-01.ibm.com/sales	
Constantia Huek Folien	http://w3-01.ibm	http://www
Cooper Cameron Corporation	http://w3-01.ibm.com/sales	
Cosco Group		
Daimler AG South East Asia Pte. Ltd.	http://w3-01.ibm.com/sales	
Decora	http://w3-01.ibm.com/sales	
Demasz	http://w3-01.ibm.com/sales	
Deutscher Ring Lebensversicherung	http://w3-01.ibm	http://www
DKSH	http://w3-01.ibm.com/sales	
DKSH	http://w3-01.ibm.com/sales	
dm-drogerie markt GmbH & Co. KG	http://w3-01.ibm	http://www
Dongbu Fire and Marine Insurance	http://w3-01.ibm.com/sales	
Douglas Holding	http://w3-01.ibm.com/sales	
Douglas IT Service		http://www
EBRZ	http://w3-01.ibm	http://www
ECKA Granualte GmbH & Co. KG	http://w3-01.ibm.com/sales	
Edwards	http://w3-01.ibm	http://www
Egaz-Degaz Zrt.	http://w3-01.ibm.com/sales	
El Palicio de Hierro	http://w3-01.ibm.com/sales	
Empresas CMPC	http://w3-01.ibm.com/sales	
Energen	http://w3-01.ibm	http://www
Epson Singapore	http://w3-01.ibm.com/sales	
Ergon	http://w3-01.ibm	http://www
Ergon	http://w3-01.ibm	http://www
Erstes Burgenländisches Rechenzentrum GmbH	http://w3-01.ibm	http://www
Esquire Corporation	http://w3-01.ibm.com/sales	
EVU Zählwerk		http://www
Fossil	http://w3-01.ibm	http://www