POWER7 智慧能量

IBM 系統暨科技事業處
Power Systems 產品經理 Thomas Chiou

Agenda

- Smart Systems for Smart Planet
- POWER7 Servers
- Power Systems Migration – p5/p6 migrate to p7
- x86 Migration – Wintel Linux application migrate to Power Systems
- HP/Sun Migration – Migration Factory

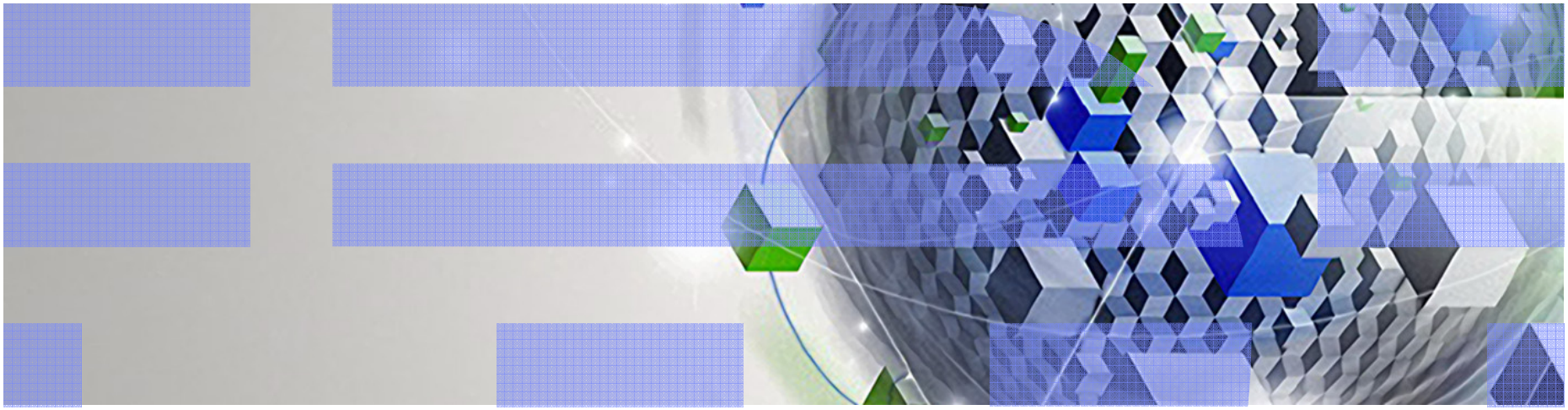
Source: If applicable, describe source origin

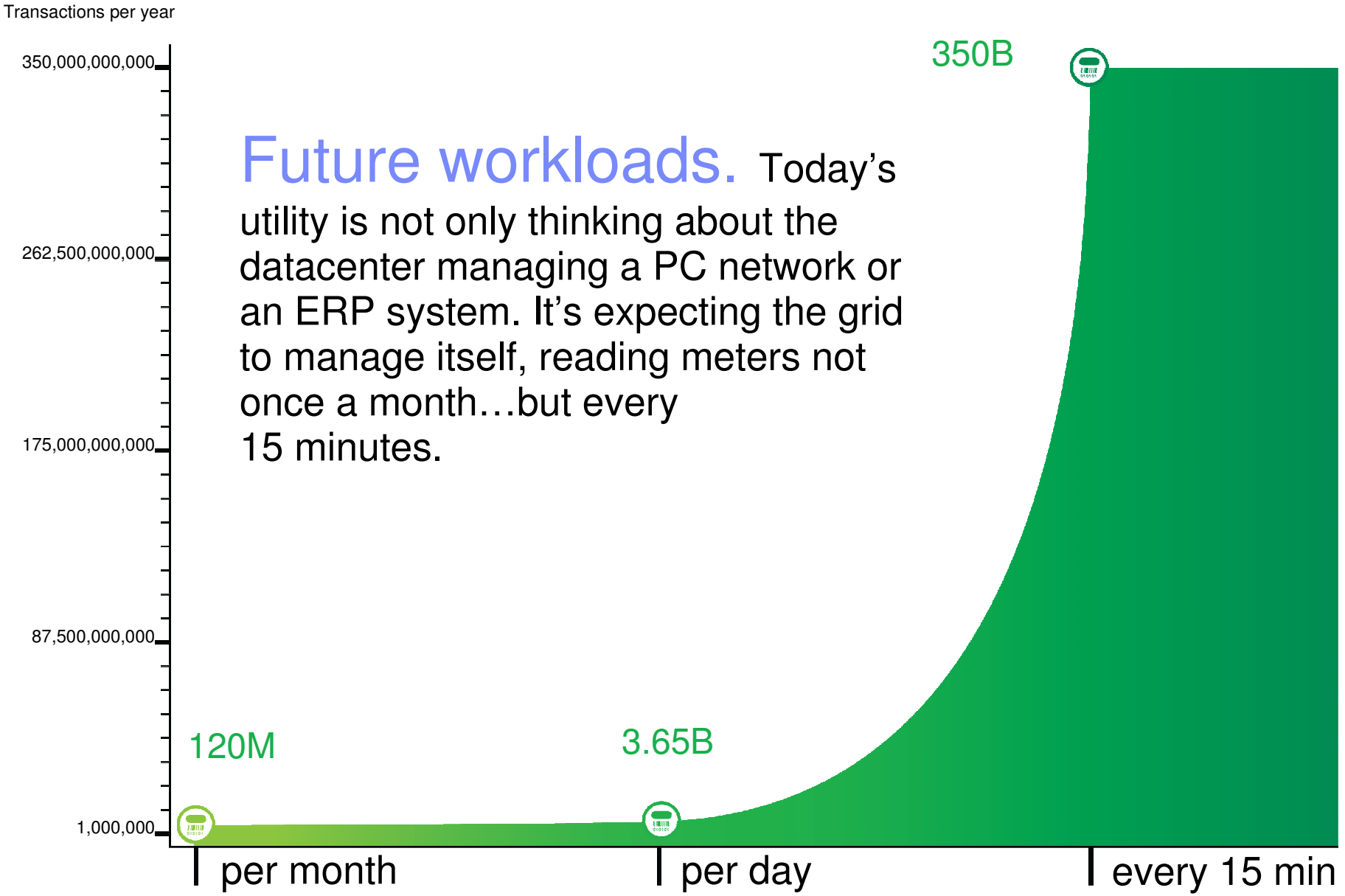
面向智慧地球的智慧系统

我們的世界：滿足客户需求需要**智慧的系统：**

60億人X每天**24**小時X每年**365**天X**183**個國家X**430億個應用**

- **重新定義性能**的需求越來越明確
- 考慮智慧地球的實際情况，智慧的系统**優化工作負載**





Future workloads. Today's

utility is not only thinking about the datacenter managing a PC network or an ERP system. It's expecting the grid to manage itself, reading meters not once a month…but every 15 minutes.

The world's first "smart grid" appliance

1,000,000,000s

The number of energy flow transactions utilities companies must handle securely and efficiently, on a rapidly growing basis

eMeter™

Tivoli software

WebSphere software

POWER7 BUILT ON Power™

The challenge

Municipal and mid-sized electric, gas and water utilities companies struggle to keep up with the rapidly growing demand for by consumers to manage energy usage down to the individual networked appliance

The solution

Built on the leadership performance and energy efficiency of POWER7, coupled with eMeter and IBM software and services, the smart appliance allows for rapid "out of the box" smart grid implementations, and can cut implementation time from one year to six months, and shave 60% off implementation costs

Smarter Systems for a Smarter Planet. Instrumented. Interconnected. Intelligent.

Smarter Money

Power Systems performance, security and availability are capabilities that provide the world's largest banks with the ability to move today's money - intangible, invisible information - from a paycheck to a bank to a retailer and back into another business account.

Smarter Cities

Cities large and small depend on the **ability of Power Systems to sift through the data** needed to not only solve crimes and respond to emergencies, but to help prevent them. Power Systems help manage traffic, share information across city agencies, keep citizens informed and give them access to services.

Smarter Telecom

Telcos are using Power Systems to deliver new services dynamically to an exploding number of devices - and **Power's scalability** means that new services can be added quickly, new clients can be billed accurately, and costs can be reduced with consolidation.

Transformations to “smarter” solutions require smarter systems that:

Scale quickly and efficiently

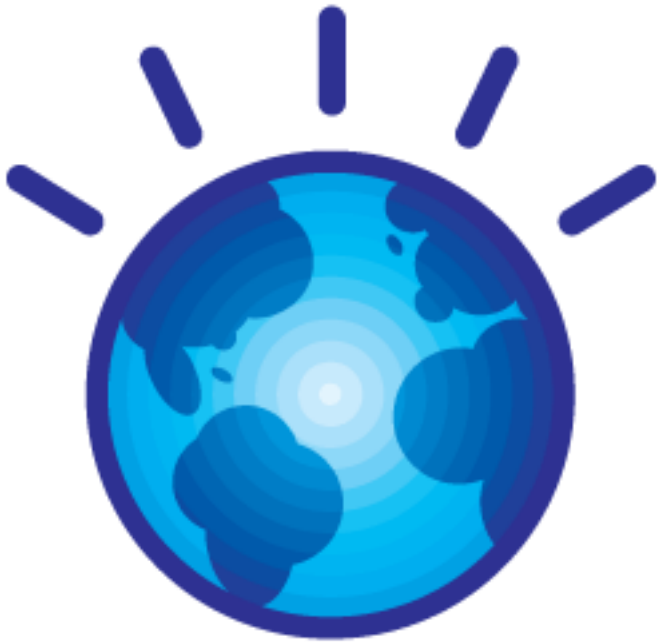
Optimize workload performance

Flexibly flow resources

Avoid downtime

Save energy

Automate management tasks



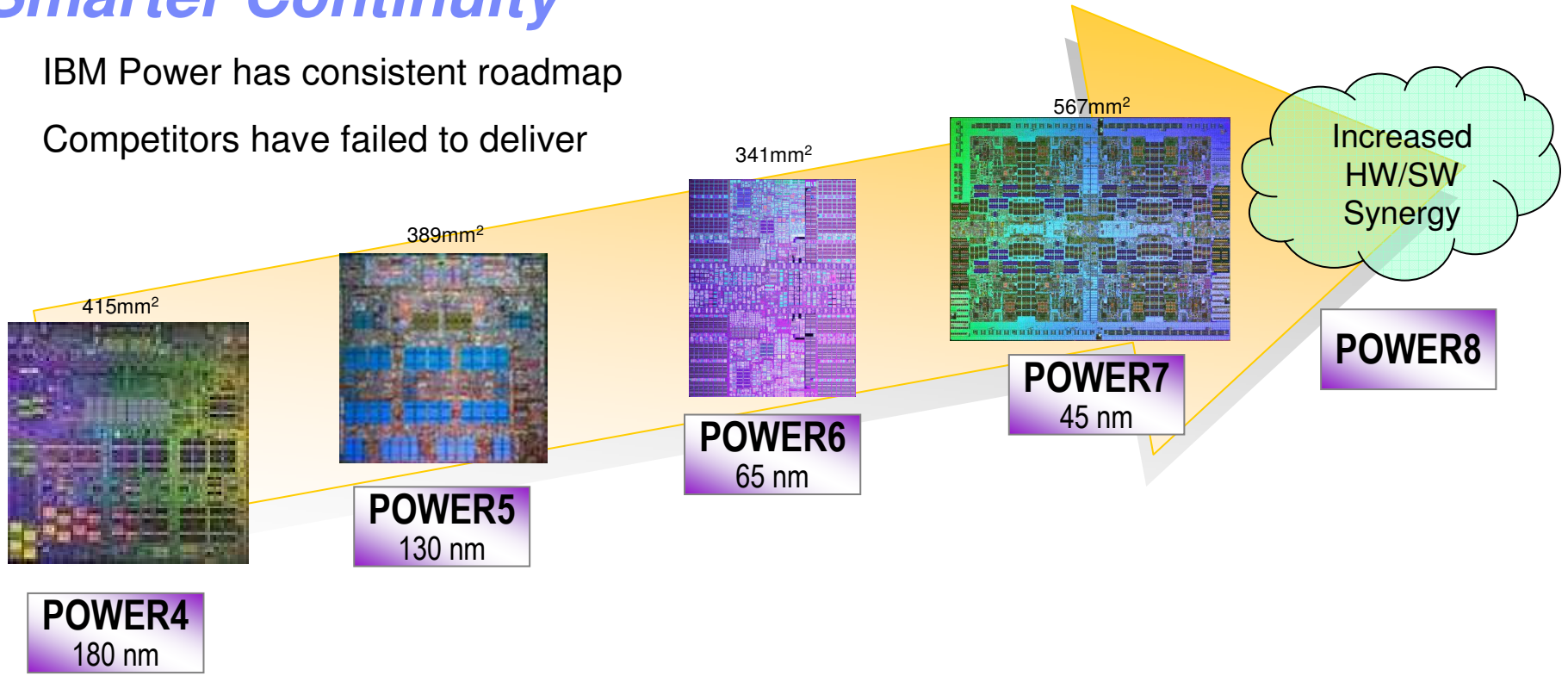
POWER7伺服器設計遠見

Designed, integrated systems
are part of the transformational story
of the next decade.

為接下來的十年盛世 設計好的 整合系統

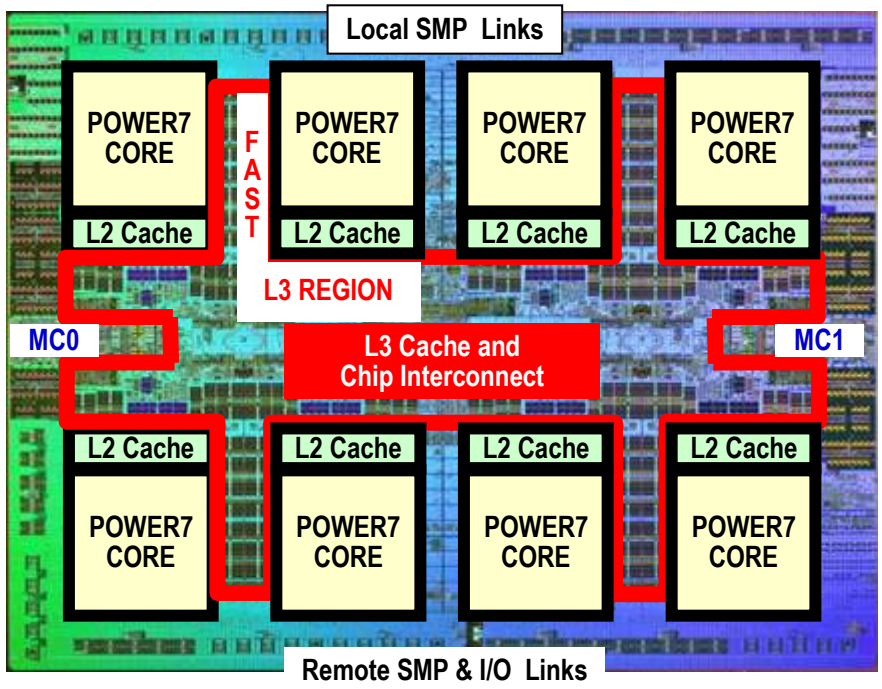
Smarter Continuity

- IBM Power has consistent roadmap
- Competitors have failed to deliver



2001	2004	2007	2010	
▪ Dual Core ▪ Shared Cache ▪ Large SMP ▪ Distributed Switch ▪ Dynamic LPARs	▪ 2 Thread SMT ▪ Enhanced Scaling ▪ Integrated Mem Ctrl ▪ Memory bandwidth ▪ Virtualization	▪ High Frequency ▪ Decimal FP, Altivec ▪ CPU Recovery ▪ Dual Scope SMP ▪ Dyn Energy Mgmt	▪ High Multi-Core ▪ 4 Thread SMT ▪ On-Chip eDRAM ▪ Energy Optimized ▪ Massive SMP	▪ Concept Defined ▪ Building Prototype ▪ On Schedule ▪ Aligned Roadmap ▪ HW/SW Synergy

POWER7 Processor Chip



Binary Compatibility with POWER6

Cores : 8 (4 / 6 core options)

567mm^2 Technology:
- 45nm lithography, Cu, SOI, eDRAM

Transistors: 1.2 B
- Equivalent function of 2.7B
- eDRAM efficiency

Eight processor cores
- 12 execution units per core
- 4 Way SMT per core – up to 4 threads per core
- 32 Threads per chip
- L1: 32 KB I Cache / 32 KB D Cache
- L2: 256 KB per core
- L3: Shared 32MB on chip eDRAM

Dual DDR3 Memory Controllers
- 90 GB/s Memory bandwidth per chip

Scalability up to 32 Sockets
- 360 GB/s SMP bandwidth/chip
- 20,000 coherent operations in flight

Power your planet.

Workload-Optimizing Systems

+

AIX® - the future of UNIX

Total integration with i

Scalable Linux® ready for x86 consolidation

Virtualization without Limits

- ✓ Drive over 90% utilization
- ✓ Dynamically scale per demand

Dynamic Energy Optimization

- ✓ 70-90% energy cost reduction
- ✓ EnergyScale™ technologies

Resiliency without Downtime

- ✓ Roadmap to continuous availability
- ✓ High availability systems & scaling

Management with Automation

- ✓ VMControl to manage virtualization
- ✓ Automation to reduce task time

Smarter Systems for a Smarter Planet.

Power 750 8233-E8B

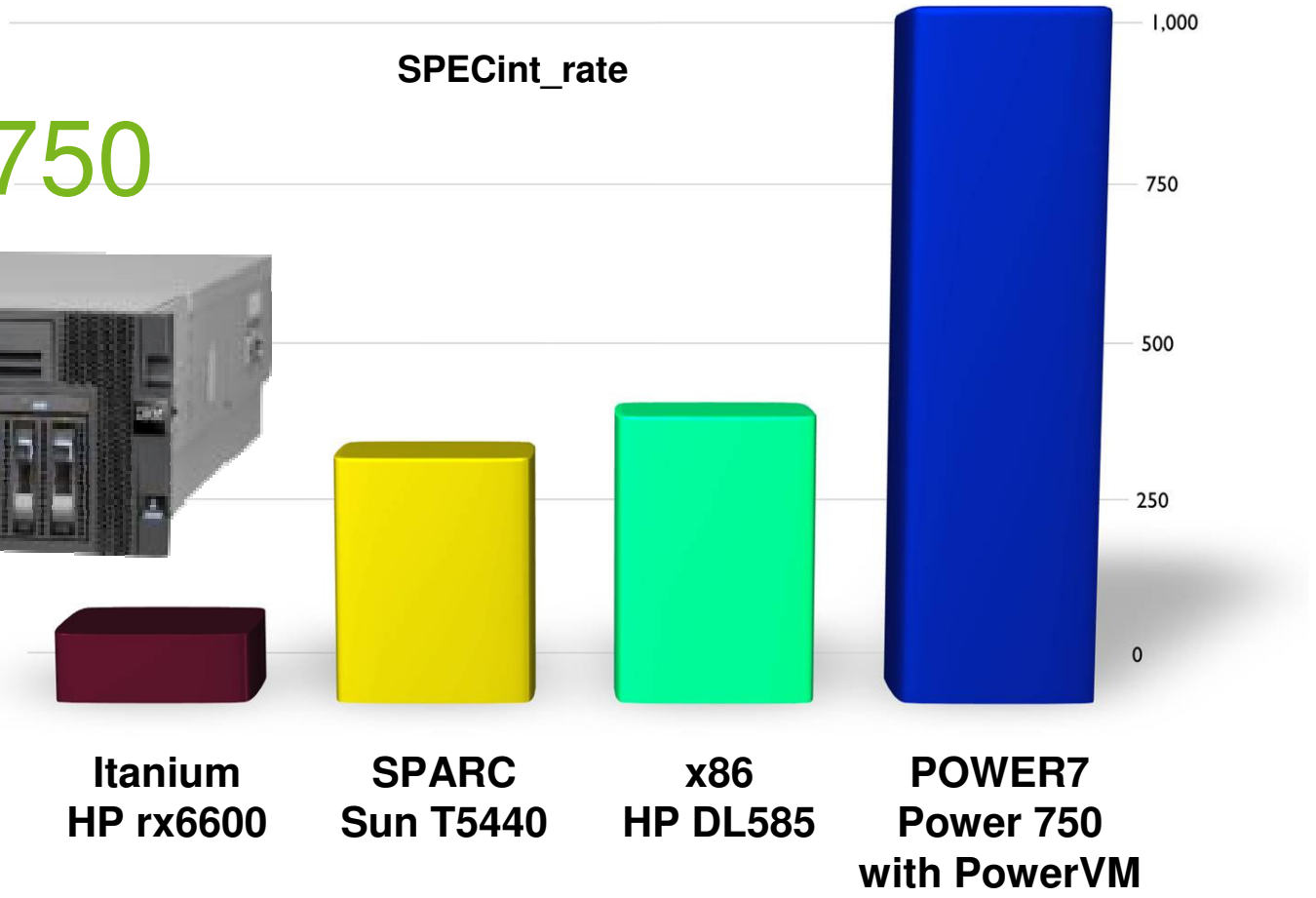
4U

- ✓ 1 to 4 sockets
- ✓ 8 cores per socket
- ✓ 3.0 to 3.55 GHz
- ✓ Energy-Star Qualified
- ✓ Up to 181,000 CPW
- ✓ Up to 331.06 rPerf

The Highest Performing 4-socket system on the planet

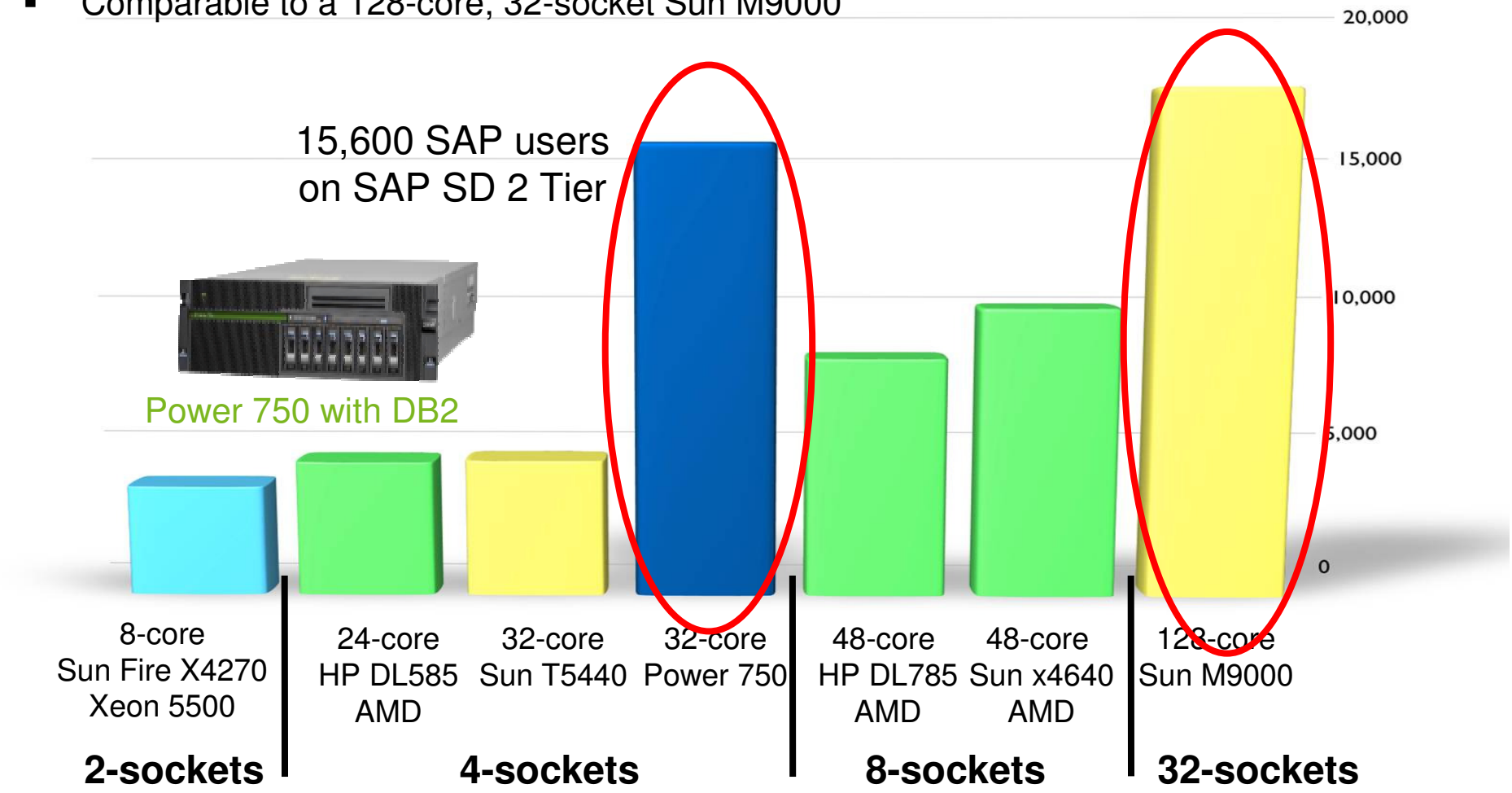
POWER7 continues to break the rules with more performance

Power 750



The Highest Performing 4-socket system on the planet

- More SAP performance than any 8-socket system
- Comparable to a 128-core, 32-socket Sun M9000

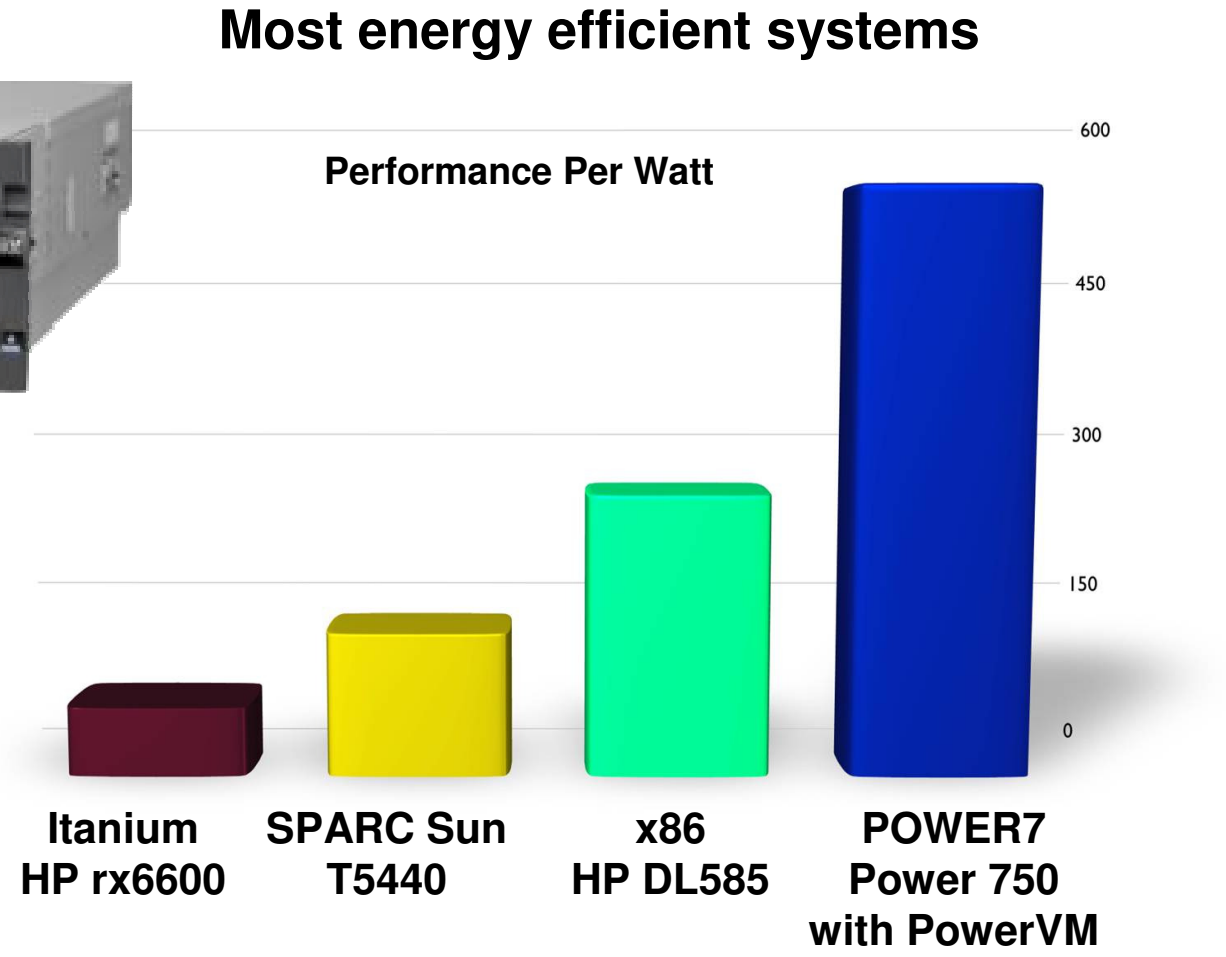


•Best SAP 2-Tier Results for 2, 4 , 8 and 16 sockets.
•See SAP Benchmarks chart for detail or SAP website
http://www.sap.com/solutions/benchmark/sd2tier.epx

The Most Energy Efficient 4-socket system on the planet

The first Energy Star certified in server category

Power 750



The MVP of 4-socket servers Greater than 15 leadership claims

- *SAP SD 2-Tier*
- *SPECjbb2005*
- *SPECint_rate2006*
- *SPECfp_rate2006*
- *Linpack*

IBM Power 750

PowerVM™ AIX® i for Business Linux® POWER7 BUILT ON Power™

Power 770

9117-MMB

- ✓ 12 Core 4U Nodes
- ✓ Up to 4 Nodes per system
- ✓ 3.5 GHz
- ✓ Capacity on Demand
- ✓ Enterprise RAS
- ✓ Up to 248,550 CPW
- ✓ Up to 493.37 rPerf

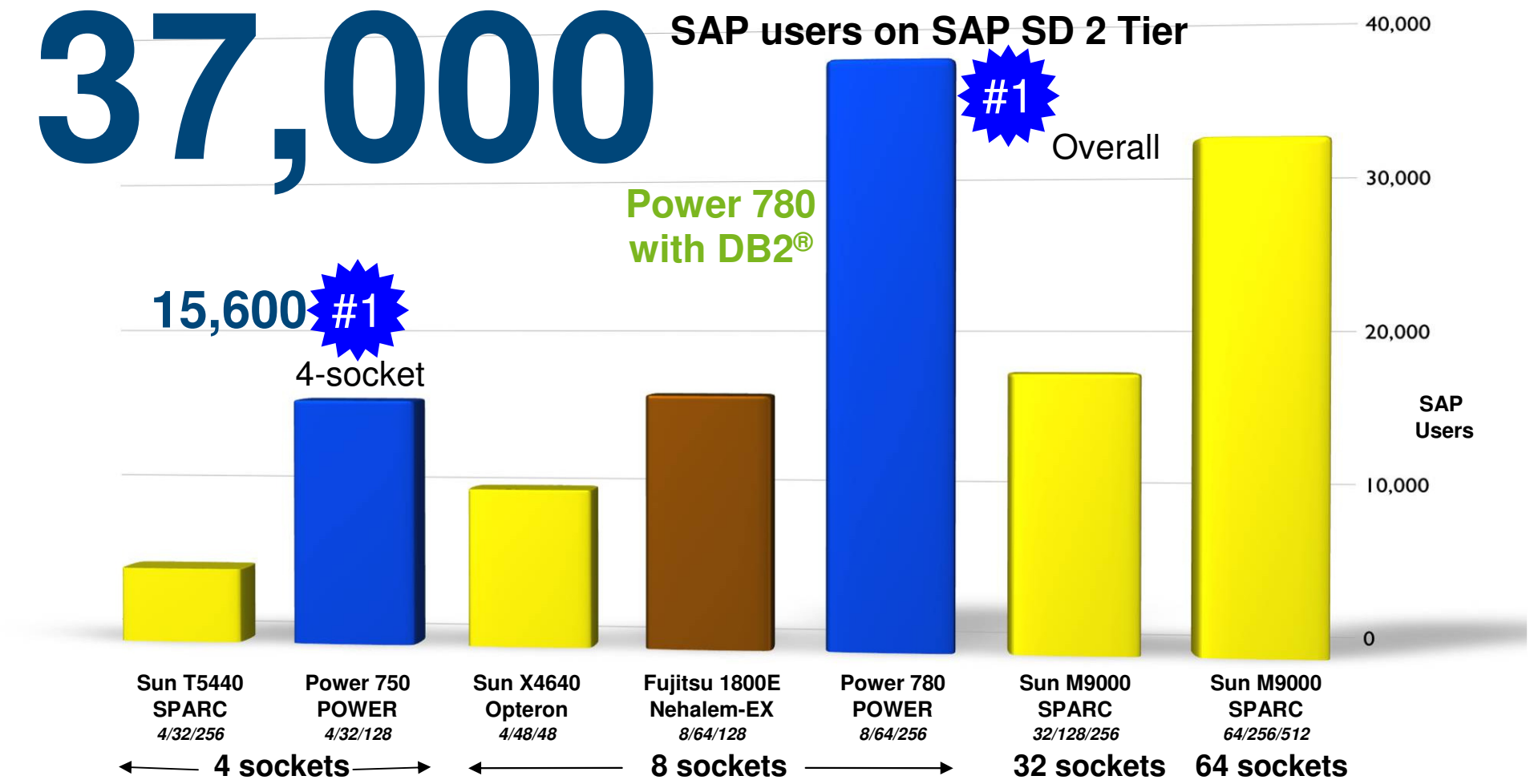
Power 780

9179-MHB

- ✓ New Modular High-End
- ✓ Up to 64 Cores
- ✓ TurboCore Mode
- ✓ 3.86 or 4.14 GHz
- ✓ Up to 343,050 CPW
- ✓ Up to 685.09 rPerf
- ✓ Capacity on Demand
- ✓ Enterprise RAS
- ✓ 24x7 Warranty
- ✓ PowerCare

More SAP performance than any system in the industry

20% more performance … one-fourth the number of cores vs. Sun M9000

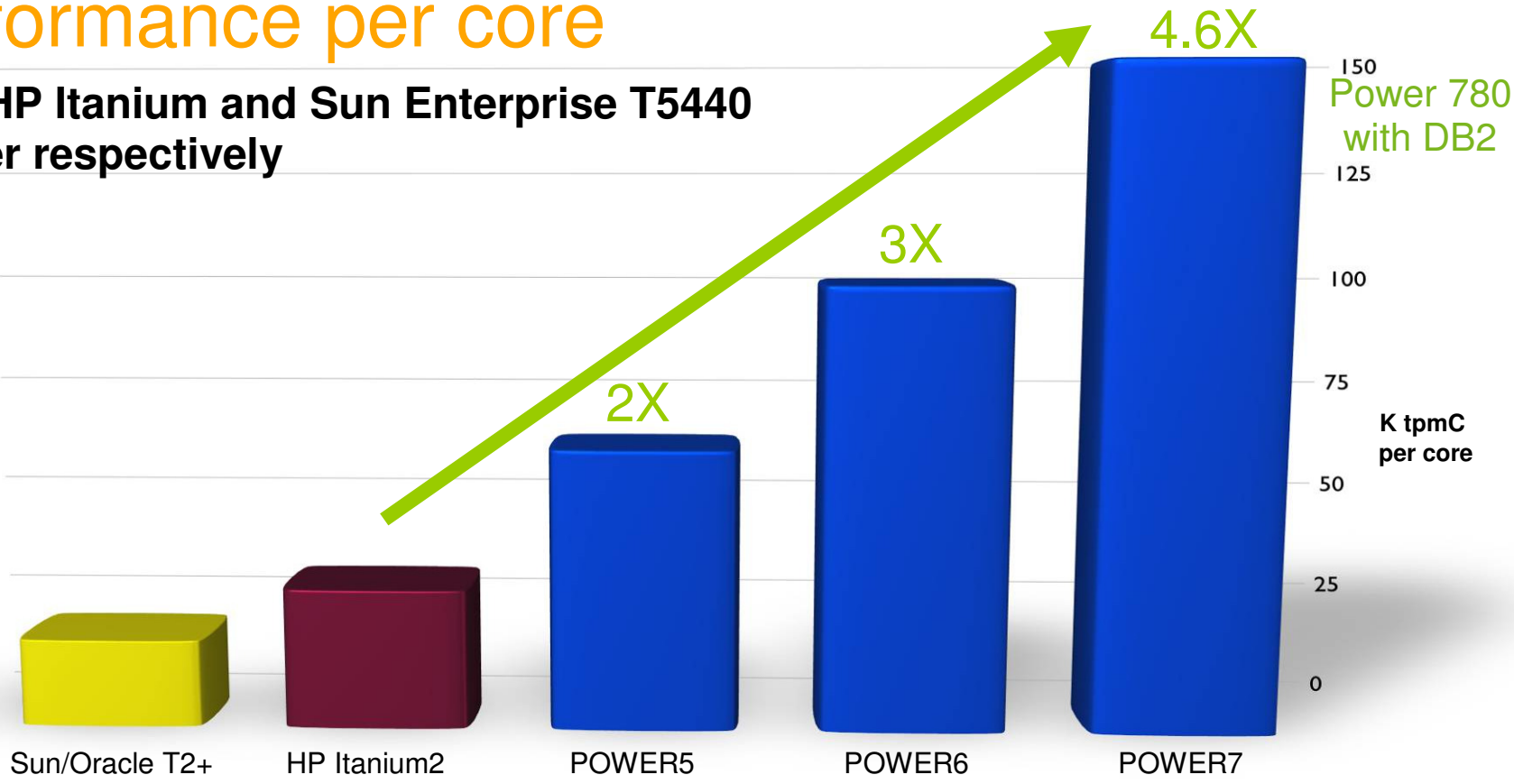


Systems are listed with processor chips/core/threads under system name; IBM Power System 780, 8p / 64–c / 256–t, POWER7, 3.8 GHz, 1024 GB memory, 37,000 SD users, dialog resp.: 0.98s, line items/hour: 4,043,670, Dialog steps/hour: 12,131,000, SAPS: 202,180, DB time (dialog/ update):0.013s / 0.031s, CPU 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 4/1/2010; Source: http://www.sap.com/solutions/benchmark/sd2tier.epx - See Power 780 benchmark details for more information

More TPC-C performance per core than any system in the industry

4.6 to 7.5 times more performance per core

than HP Itanium and Sun Enterprise T5440 cluster respectively



Best results listed for IBM POWER, HP, and Sun/Oracle systems over 1M tpmC.
Source: http://www.tpc.org as of 4/1/08. See Power 780 benchmark details for specific results.

The future of UNIX

AIX 6 Editions for entry to enterprise servers & workload consolidation
AIX 7* to exploit 1024 POWER7 threads, and support AIX 5.2 WPARs

Total integration with i

IBM i 7.1 features XML in DB2, automatic workload optimization with SSDs, Rational Open Access: RPG Edition and much more

Scalable Linux ready for x86 consolidation

POWER7 support for RHEL 5.5 & 6*, SLES 10 & 11 plus PowerVM Lx86 performance optimized for x86 server consolidation

All 3 operating environments available with POWER7

*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.

Power is...

Performance that delivers business advantage

Workload-Optimizing Systems

Virtualization without Limits

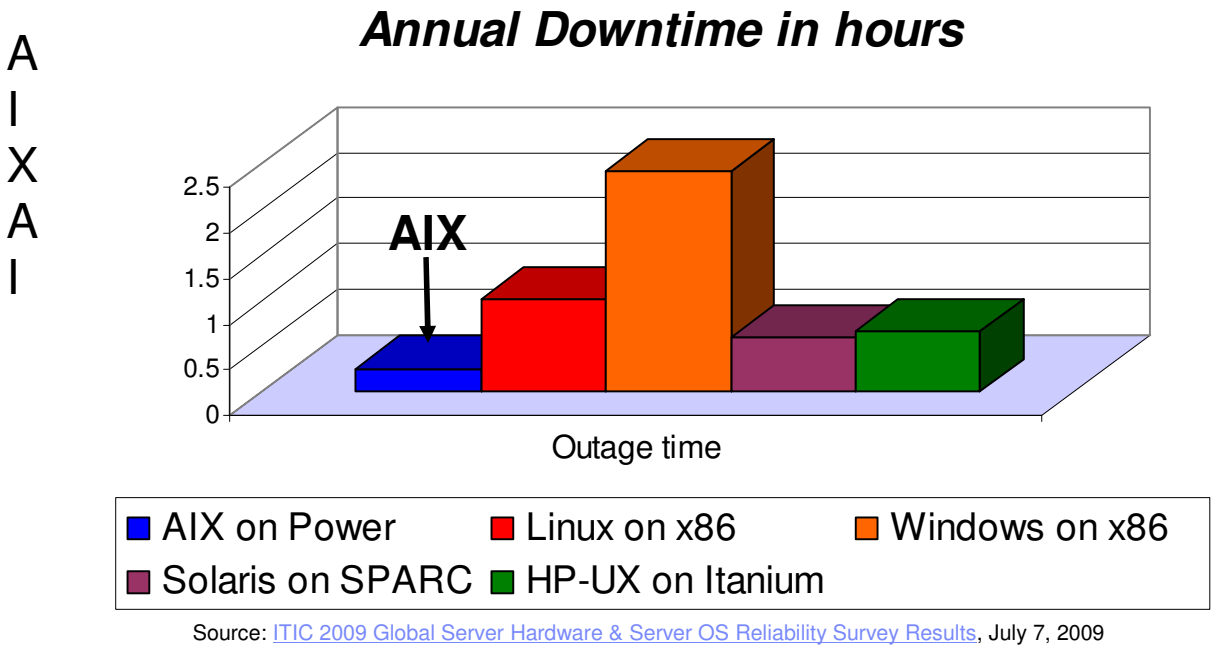
Intelligent Energy Optimization

Ease of Ownership

Power & AIX has 99.997% uptime

- 54% of IT executives and managers say that they require 99.99% or better availability for their applications

- **Power Systems with AIX delivers the best availability of UNIX, Linux, Windows choices**



Source: ITIC 2009 Global Server Hardware & Server OS Reliability Survey Results, July 7, 2009

Compared to AIX, downtime could be 4 times higher on Linux x86 and 10 times higher on Windows

AIX 獲取最高安全認證作業系統之一

IBM UNIX got the highest security level certification among all other UNIX / Linux Operating System under Common Criteria security evaluation of Information Technology Security Evaluation Criteria (ITSEC)

List of Certified Operating Systems are:

IBM PR/SM LPAR	EAL 5	Certificate
IBM PR/SM z9 109	EAL 5	Certificate
IBM PR/SM z990	EAL 5	Certificate
IBM PR/SM z990/890	EAL 5	Certificate
IBM AIX 5.3 CAPP	**EAL 4+**	**Certificate**
IBM AIX 5.3 LSPP	**EAL 4+**	**Certificate**
IBM LPAR	**EAL 4+**	**Certificate**
IBM RHEL4 Update 1	EAL 4+	Certificate
IBM RHEL5	EAL 4+	Certificate
IBM SLES9	EAL 4+	Certificate
HP RHEL5	EAL 4+	Certificate
HP RHEL3 AS	EAL 3+	Certificate
HP RHEL3 WS	EAL 3+	Certificate
HP RHEL4 Update 2	EAL 3+	Certificate
HP SLES8	EAL 3+	Certificate
SGI RHEL 4 AS	EAL 3+	Certificate
SGI SLES9		EAL 3+ Certificate
SUSE Linux V8	EAL 3+	Certificate
SUSE Linux V8	EAL 2+	Certificate


Deutsches
IT-Sicherheitszertifikat
Bundesamt für Sicherheit in der Informationstechnik
BSI
Bundesamt für Sicherheit
BSI-DSZ-CC-0217-2003
IBM AIX 5L for POWER 5.2
Maintenance Package 5200-01,
Program Number 5765-E62
from
IBM Corporation
Common Criteria Arrangement
The IT product identified in this certificate has been evaluated at an accredited and licensed/approved evaluation facility using the Common Methodology for IT Security Evaluation, Part 1 Version 0.6, Part 2 Version 1.0, extended by CEM supplementation "ALC_FLR – Flaw remediation", Version 1.1, February 2003, for conformance to the Common Criteria for IT Security Evaluation, Version 2.1 (ISO/IEC 15408:1999).
Evaluation Results:
PP Conformance: Controlled Access Protection Profile, Issue 1.d, 8 October 1999
Functionality: Controlled Access Protection Profile conformant plus product specific extensions
Common Criteria Part 2 extended
Assurance Package: Common Criteria Part 3 conformant
EAL4 augmented by
ALC_FLR.1 (Life cycle support - Basic flaw remediation)
This certificate applies only to the specific version and release of the product in its evaluated configuration and in conjunction with the complete Certification Report.
The evaluation has been conducted in accordance with the provisions of the certification scheme of the German Federal Office for Information Security (BSI) and the conclusions of the evaluation facility in the evaluation technical report are consistent with the evidence adduced.
The notes mentioned on the reverse side are part of this certificate.
Bonn, 8th September 2003
The President of the Federal Office for Information Security
Dr. Helmbrecht
IT Security Certified
SOGIS-MRA

Source : http://www.atsec.com/01/index.php?id=06-0001-03

up to 90%

***Reduction in energy usage moving from POWER5 to POWER7*.**

Savings extend to floor space, software license costs,
and maintenance. Increase your performance and capacity.

2 POWER5 590 systems
64 cores @ 2.1 GHz
30% utilization

1 Power 770
- *24 cores @ 3.5 GHz*
- *60% utilization*

30% effective capacity increase
90% reduction in energy usage
maintenance savings over 3 years
savings in software licensing

4 POWER5 570 systems
64 cores @ 1.9 GHz
30% utilization

1 Power 770
- *24 cores @ 3.5 GHz*
- *60% utilization*

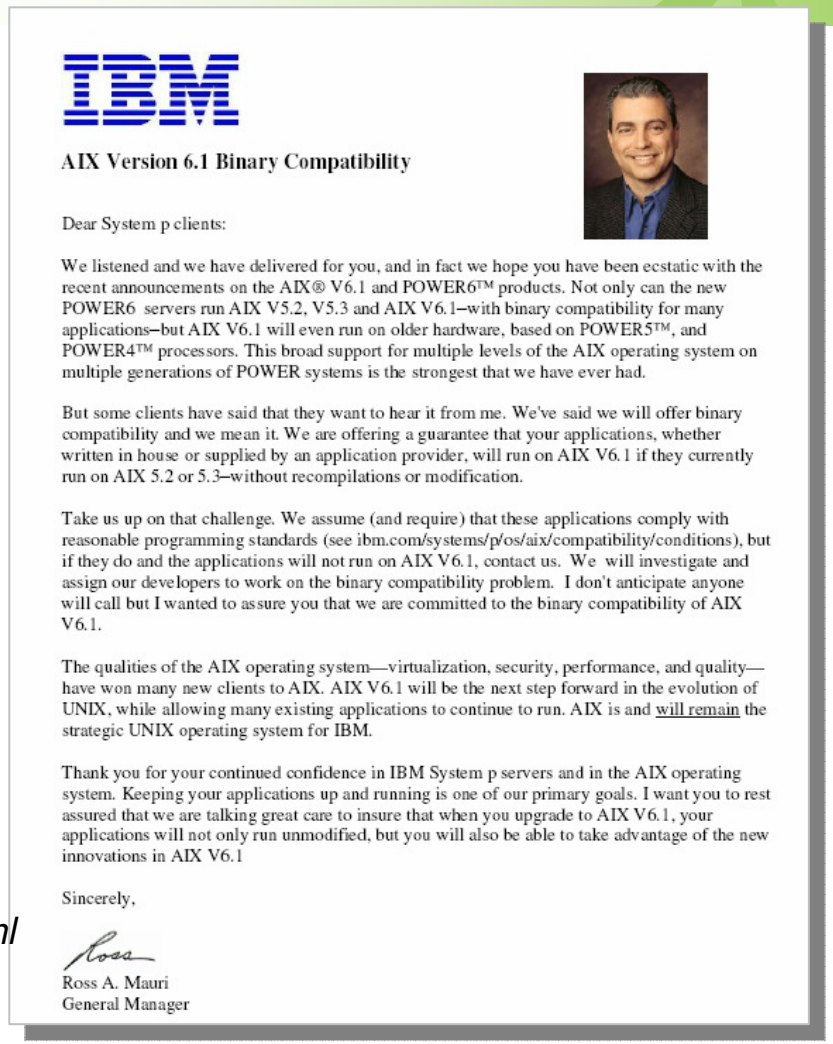
50% effective capacity increase
84% reduction in energy usage
maintenance savings over 3 years
savings in software licensing

With room to spare to consolidate x86 workloads

AIX 作業系統保證了二進位元相容性，保障客戶投資

Committed to minimizing risk and making transitions to AIX 6 as smooth as possible

- **Binary Compatibility Guarantee ***
  - *Runs on POWER4, POWER5, POWER6 systems*
- **Open Beta for AIX 6**
  - *Outstanding participation in IBM's first Open Beta for AIX (Launched July '07) with over 7,000 participants and 14,000 downloads*
- **No charge upgrade for current AIX 5L clients with AIX Software Maintenance Agreement**
- **Upgrade tools to minimize client risk**



IBM

AIX Version 6.1 Binary Compatibility

Dear System p clients:

We listened and we have delivered for you, and in fact we hope you have been ecstatic with the recent announcements on the AIX® V6.1 and POWER6™ products. Not only can the new POWER6 servers run AIX V5.2, V5.3 and AIX V6.1–with binary compatibility for many applications–but AIX V6.1 will even run on older hardware, based on POWER5™, and POWER4™ processors. This broad support for multiple levels of the AIX operating system on multiple generations of POWER systems is the strongest that we have ever had.

But some clients have said that they want to hear it from me. We've said we will offer binary compatibility and we mean it. We are offering a guarantee that your applications, whether written in house or supplied by an application provider, will run on AIX V6.1 if they currently run on AIX 5.2 or 5.3–without recompilations or modification.

Take us up on that challenge. We assume (and require) that these applications comply with reasonable programming standards (see ibm.com/systems/p/os/aix/compatibility/conditions), but if they do and the applications will not run on AIX V6.1, contact us. We will investigate and assign our developers to work on the binary compatibility problem. I don't anticipate anyone will call but I wanted to assure you that we are committed to the binary compatibility of AIX V6.1.

The qualities of the AIX operating system—virtualization, security, performance, and quality—have won many new clients to AIX. AIX V6.1 will be the next step forward in the evolution of UNIX, while allowing many existing applications to continue to run. AIX is and will remain the strategic UNIX operating system for IBM.

Thank you for your continued confidence in IBM System p servers and in the AIX operating system. Keeping your applications up and running is one of our primary goals. I want you to rest assured that we are talking great care to insure that when you upgrade to AIX V6.1, your applications will not only run unmodified, but you will also be able to take advantage of the new innovations in AIX V6.1

Sincerely,

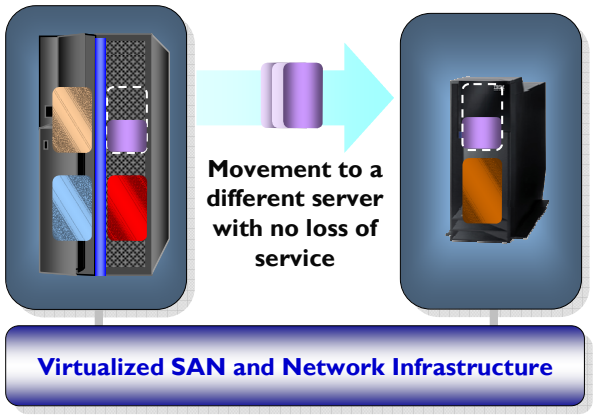
Ross A. Mauri
General Manager

** www-03.ibm.com/systems/p/os/aix/compatibility/index.html*

PowerVM Live Partition Mobility

What is it?

- A POWER6 feature that allows an entire Logical Partition (LPAR) to be relocated from one system to another with almost no impact to the end user
- The end user effect is a single delay of two seconds when the relocation is completed
- Supported by AIX V6.1, AIX V5.3 and Linux®
- PowerVM Live Partition Mobility requires that all I/O be virtualized through the Virtual I/O server at the time of the relocation



Live Partition Mobility requires the purchase of the optional PowerVM Enterprise Edition.

How it can help?

- Can make it easier to consolidate workloads from underutilized servers by facilitating the transfer of workloads with almost no end user impact
- Can provide increased flexibility to manage workloads by easily moving the workload to another system
- Facilitates increased reliability by allowing workloads to be moved away during planned outages
- PowerVM Live Partition Mobility can provide for a much more flexible and responsive IT infrastructure by reducing the cost and risk of rebalancing workloads

Moving to POWER7 – easier than ever

The challenge

Taking advantage of new technology is not always easy

The solution

IBM's commitment to binary compatibility combined with PowerVM Live Partition Mobility make the transition to POWER7 perhaps the easiest ever….

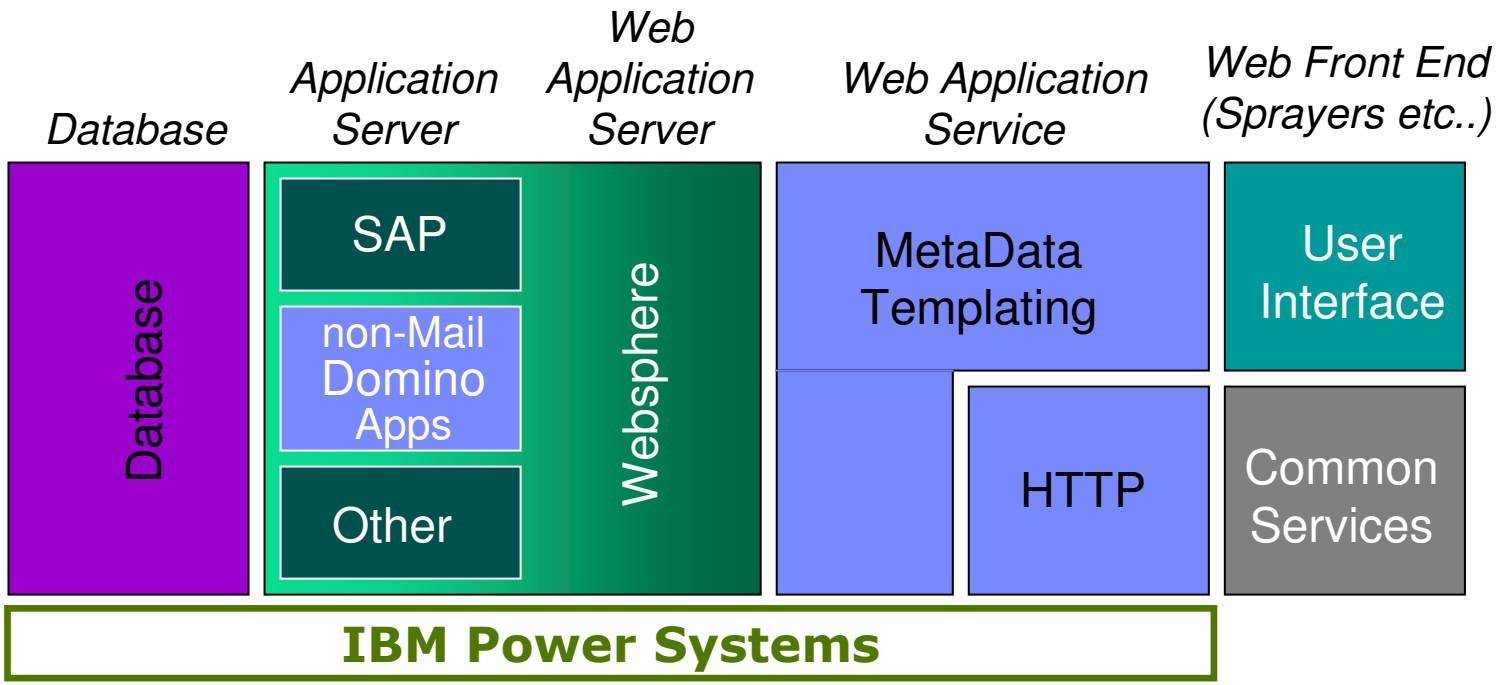
and, of course, you get better performance.

http://www-03.ibm.com/systems/power/hardware/compatibility/index.ht

> ***"The stability and reliability of the platform was evident from the start, and we put it into production tests immediately using PowerVM Live Partition Mobility to seamlessly move our SAP BI workload from the POWER6 to the new POWER7 system. We noted faster access to intelligence from our SAP and IBM DB2-based analytics system."***
>
> ***--- Curd Zechmeister***
> ***Manager, UNIX Infrastructure***

Coca-Cola Enterprises Inc.

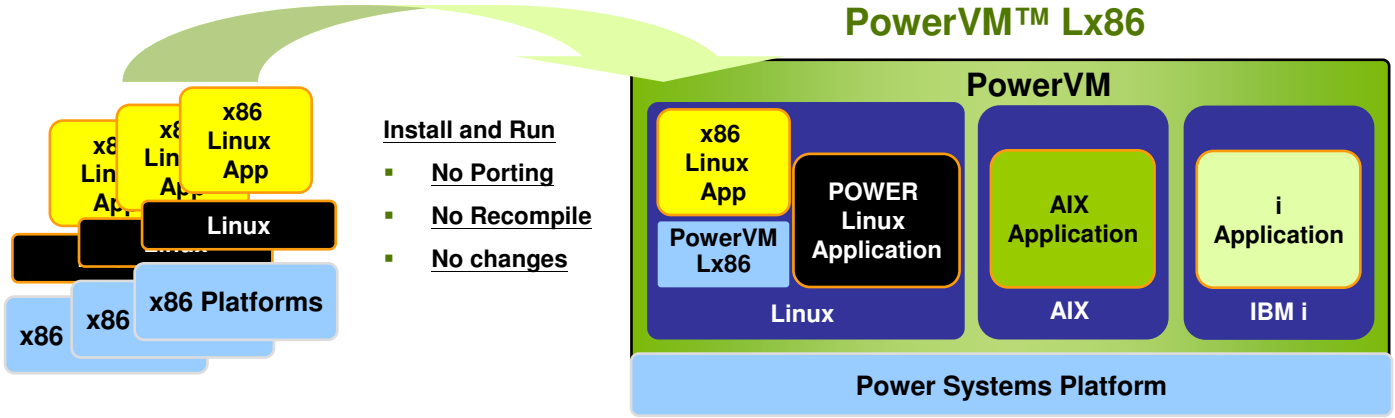
Consolidating competitive x86 transactional front-end servers that access Databases already running on AIX or IBM i



SAP Application Servers; non-Mail Domino Applications; Oracle Application Servers; WebSphere Commerce; Jboss, Apache and Tomcat Application Servers; HTTP Server; Web 2.0; Java Application Server; In-house Applications, etc…

PowerVM Lx86 Accelerates Linux Workload Migration

- PowerVM Lx86 cross-platform virtualization runs unmodified Linux/x86 applications within VMs using Linux on Power
  - Copy x86 application binaries and run them – no rewriting necessary
  - Run Linux/x86 workloads with AIX, IBM i and Linux on Power workloads
- Simplifies migration and virtualization of workloads from x86-based platforms to higher-performance Power Systems servers running Linux
- Run most existing 32-bit x86 Linux applications with no application changes
- POWER6 blades through Power 595; POWER7 servers
- Provides a convenient 'bridge' to native compilation of Linux workloads
- Included with all PowerVM Editions



92 to 1

Number of Sun SPARC Enterprise T2000's that can be consolidated into a single IBM Power 750 4 socket system saving 95% of the cores for software licensing, 97% on floorspace, and 95% on energy.

Save up to 93% in annual energy costs!

By consolidating nine 64-core HP Superdomes into ONE Power 780 system

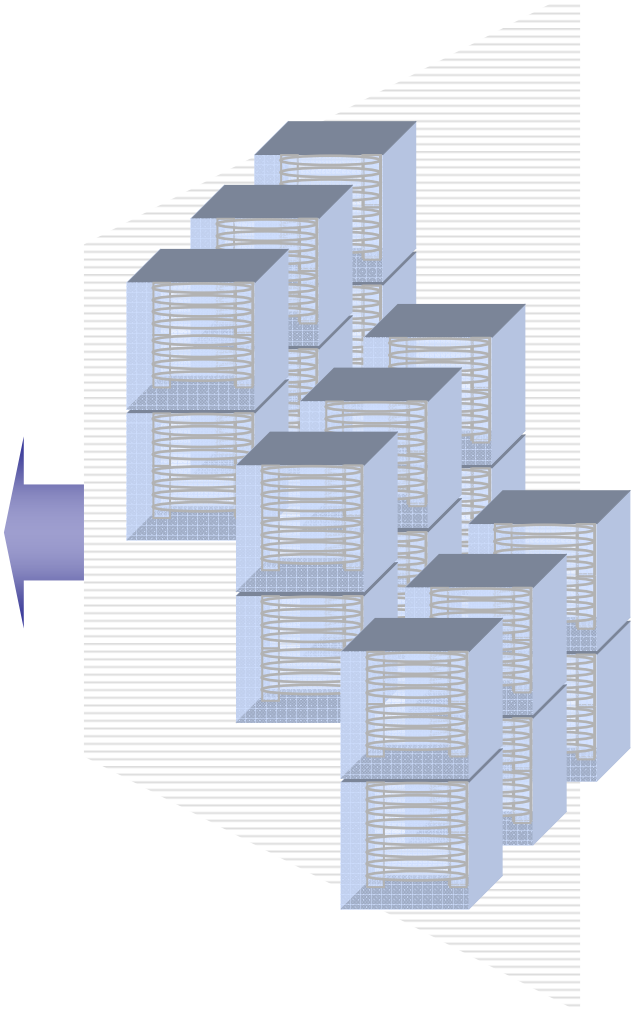
--Reduce floor space required by 91%

--Reduce processing cores by 88%

9 HP Superdomes

(@ 25% utilization)

576 total cores @ 1.6 GHz



One Power 780

(@ 75% utilization)

64 total cores @ 3.8 GHz

Only 1 Rack – 7.6 sq. ft of floor space

Up to $$$$$ in energy savings per year!

See Power 780 comparisons in backup for full substantiation details.

Save up to 95% in annual energy costs!

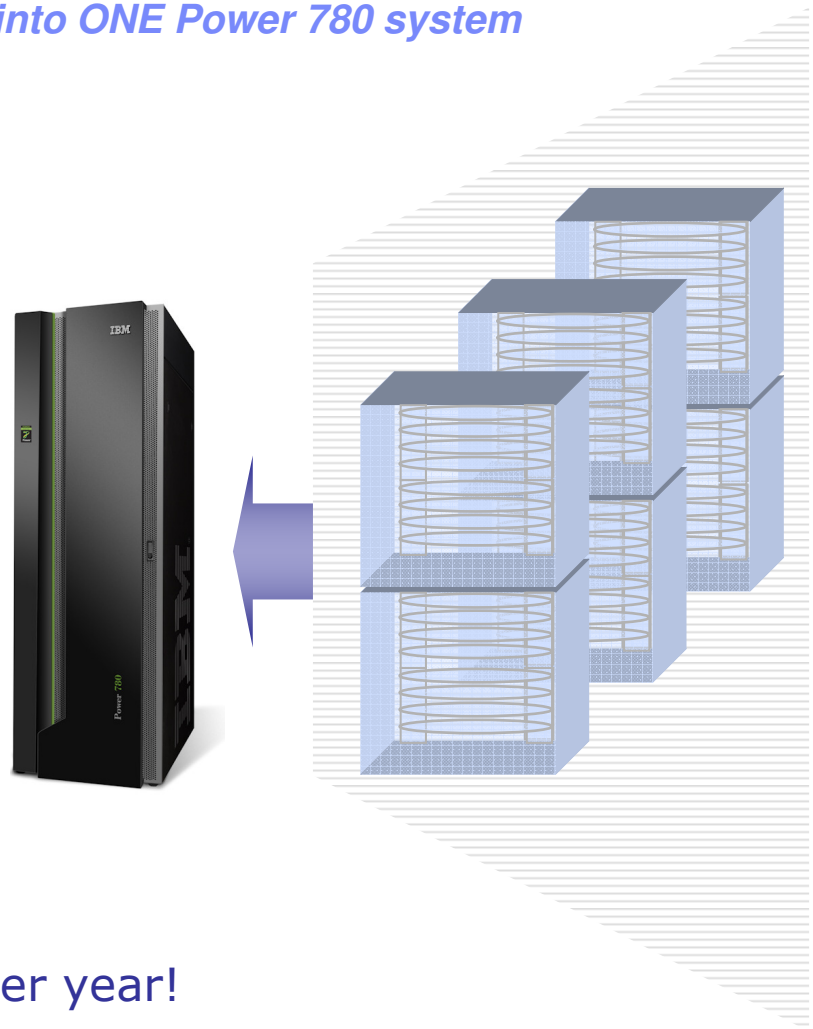
By consolidating three 256-core Sun M9000s into ONE Power 780 system

--Reduce floor space required by 88%

--Reduce processing cores by 91%

3 Sun M9000s
(@ 24% utilization)

768 total cores @ 2.88 GHz



One Power 780
(@ 75% utilization)

64 total cores @ 3.8 GHz

Only 1 Rack – 7.6 sq. ft of floor space

Up to $$$$$ in energy savings per year!

See Power 780 comparisons in backup for full substantiation details.

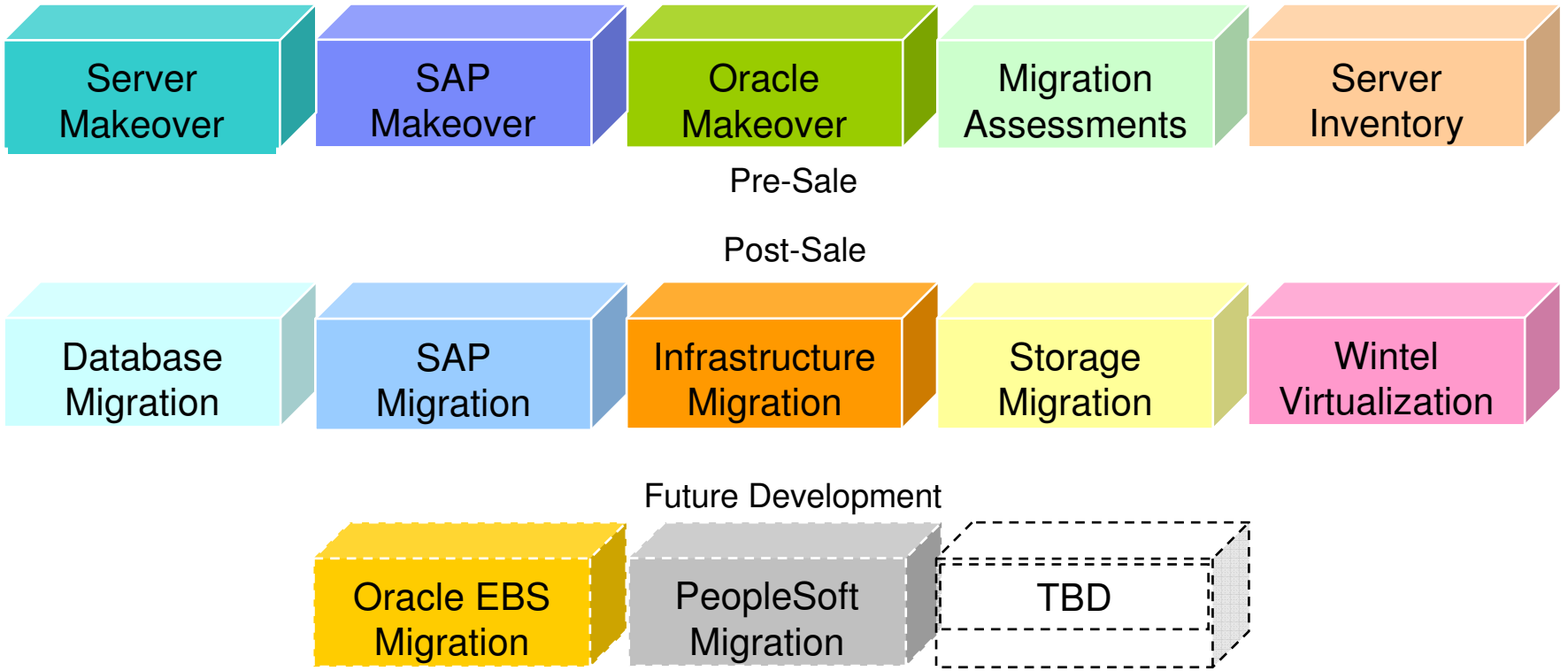
Reason for Customers to Migrate:

- Once systems are out of production, related expertise is diminished.
- Older systems have much larger footprints and therefore more expensive to use and to operate.
- Cost of Maintenance increases (sometimes geometrically) as hardware ages.
- As hardware ages, parts become less available and more expensive.
- Once hardware is retired from sales, capacity requirements cannot be met reliably.

Obstacles for Customers to Migrate:

- Don’t know feasibility ?
- How long will migration take ?
- How much will migration cost ?
- What are the successful factors and risks of migration ?
- How will migration be implemented ?
- Who can help for migration ?

Migration Factory in a Box

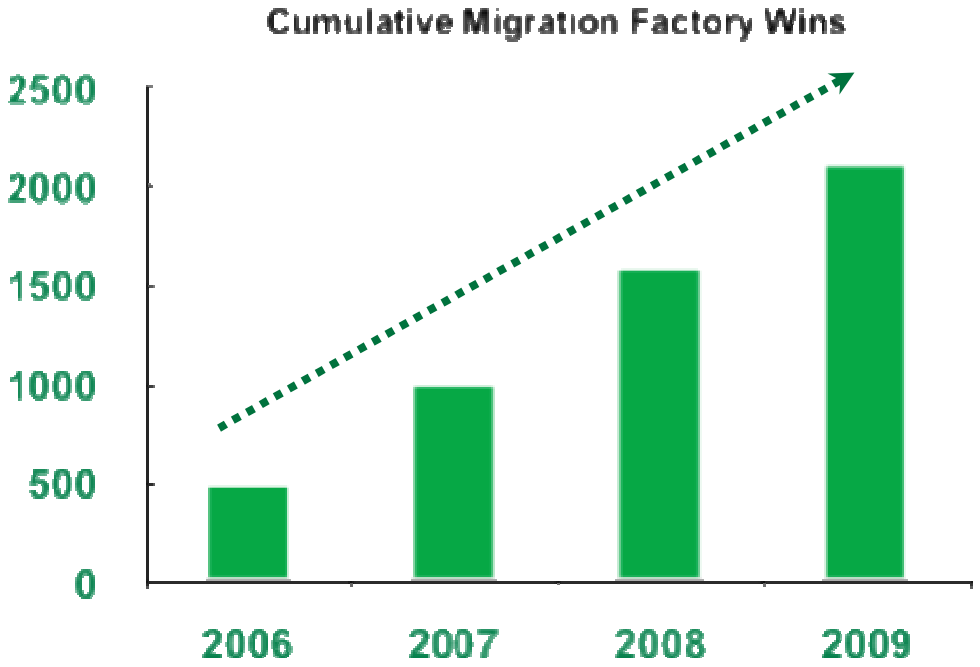


- The Migration Factory's investment in skills, methodology & tools combined with significant project experience has let to the creation of a suite of pre-defined *Migration Factory in a Box* (MiaB) services
- Each of the MiaBs is based on a set of pre-determined assumptions, constraints and scope criteria
- Global resources are offered as an option to reduce cost and delivery time to the customer
- The net result is that the *cost* of each MiaB can be reduced, thereby maximizing STG's investment in competitive migrations while providing superior value to our customers

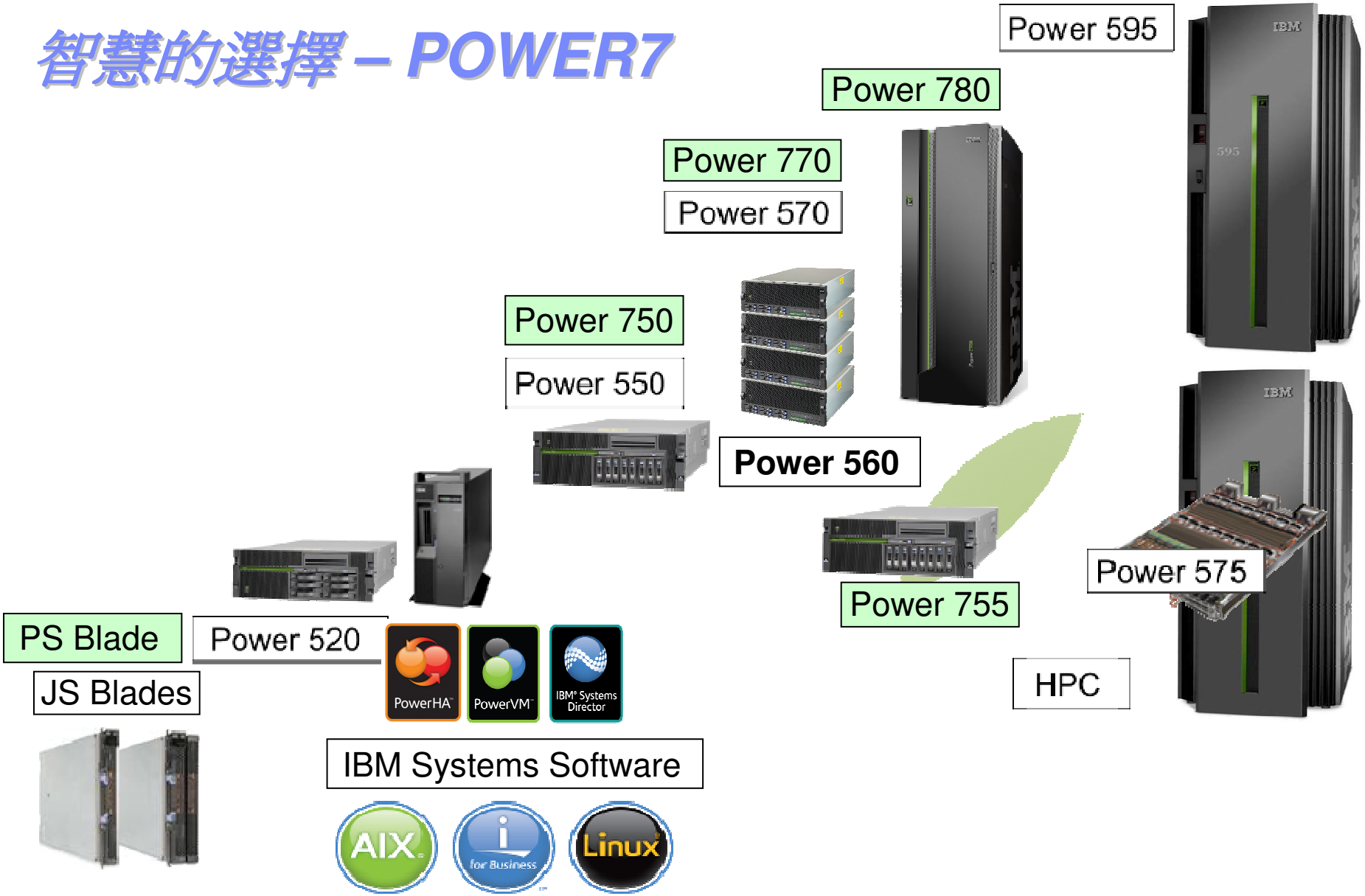
2,100

successful Power Migration Factory migrations to date.

There were over 500 Power migrations during 2009, with more than 90% from Sun and HP customers (including x86 consolidation). In 4Q09 alone, Power achieved nearly 200 competitive migrations.



智慧的選擇 – POWER7



THANK YOU