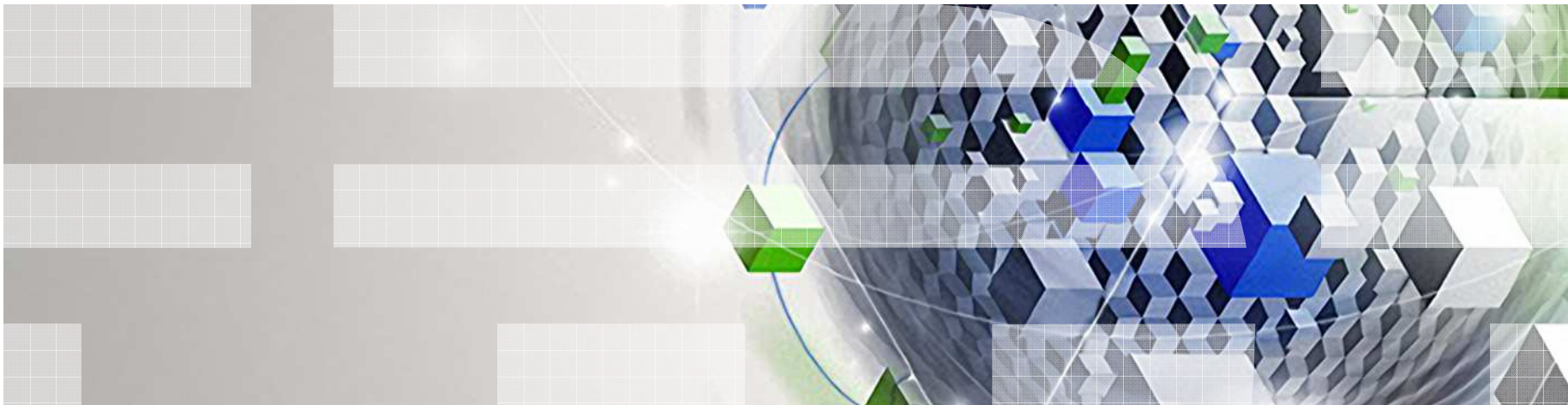


IBM BladeCenter Power Blade Overview



Power Systems Leadership Portfolio

Power 595



POWER7 Servers

- ✓ POWER7 Blades
- ✓ Power® 750 Express
- ✓ Power 755 for HPC
- ✓ Power 770 modular
- ✓ Power 780 modular high-end

Entire POWER6 line continues to be available

Power 780

Power 770
Power 570

Power 750
Power 550

Power 560

Power 520

PS Blades
JS Blades

High
Performance
Computing



Power Systems Software



Power 755

Power 575

Power your planet.

IBM BladeCenter PS700/701/702 Express

Smart BladeCenter Solutions with Power Blades

- **Performance and Energy Efficiency**

- Smart choices to minimize complexity, improve efficiency and scale easily
 - Single-wide 4 or 8-core or Double-wide 16-core
 - Elegantly simple scalability
- Intelligent Threads
 - Utilizes more threads when workloads benefit
- Intelligent energy optimization with EnergyScale Technology
 - Boosts frequency for more performance
- High Performance Computing acceleration (Altivec SIMD acceleration)
 - Execute up to eight single-precision or double-precision floating point operations per clock cycle per core

- **Flexibility and Choice**

- Supports AIX, i and Linux operating systems
 - Consolidate all three on a single platform
- Supports multiple BladeCenter chassis

- **Investment Protection**

- IBM BladeCenter's innovative, open design with support for Open Fabric Manager

What's your requirement?

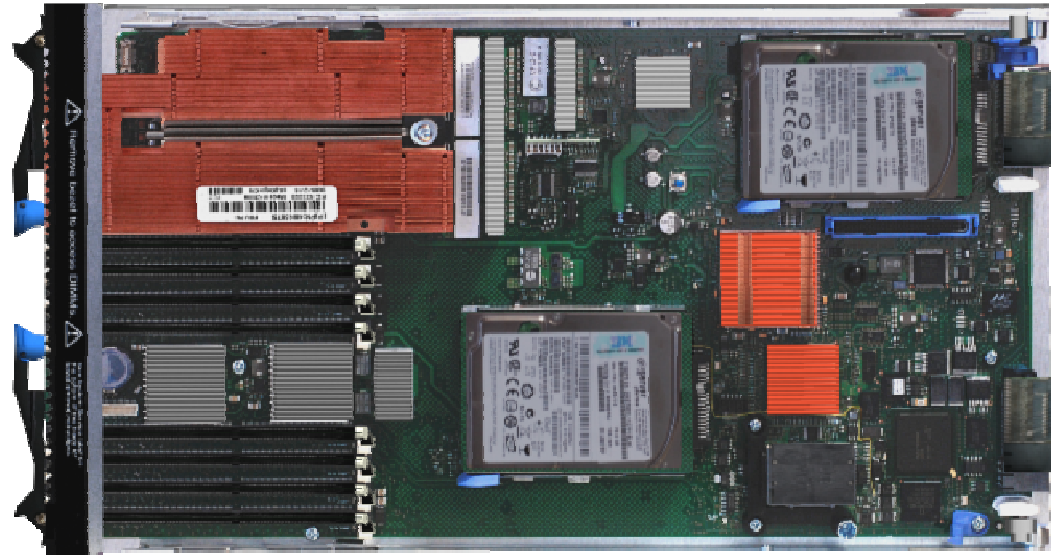
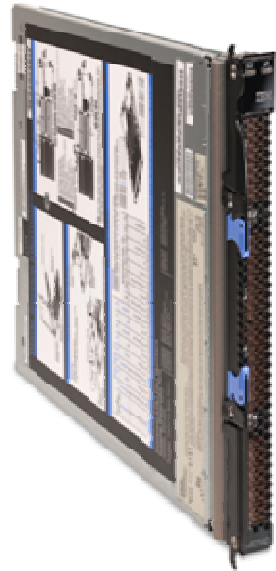
- ✓ Highly Virtualized environments with demanding Commercial workload performance
- ✓ Infrastructure Consolidation and Application Serving
- ✓ Replace traditional rack & tower based servers with blades



- ✓ 4, 8 or 16 cores
- ✓ Single or Double Wide
- ✓ 3.0GHz POWER7
- ✓ Up to 256GB of Memory



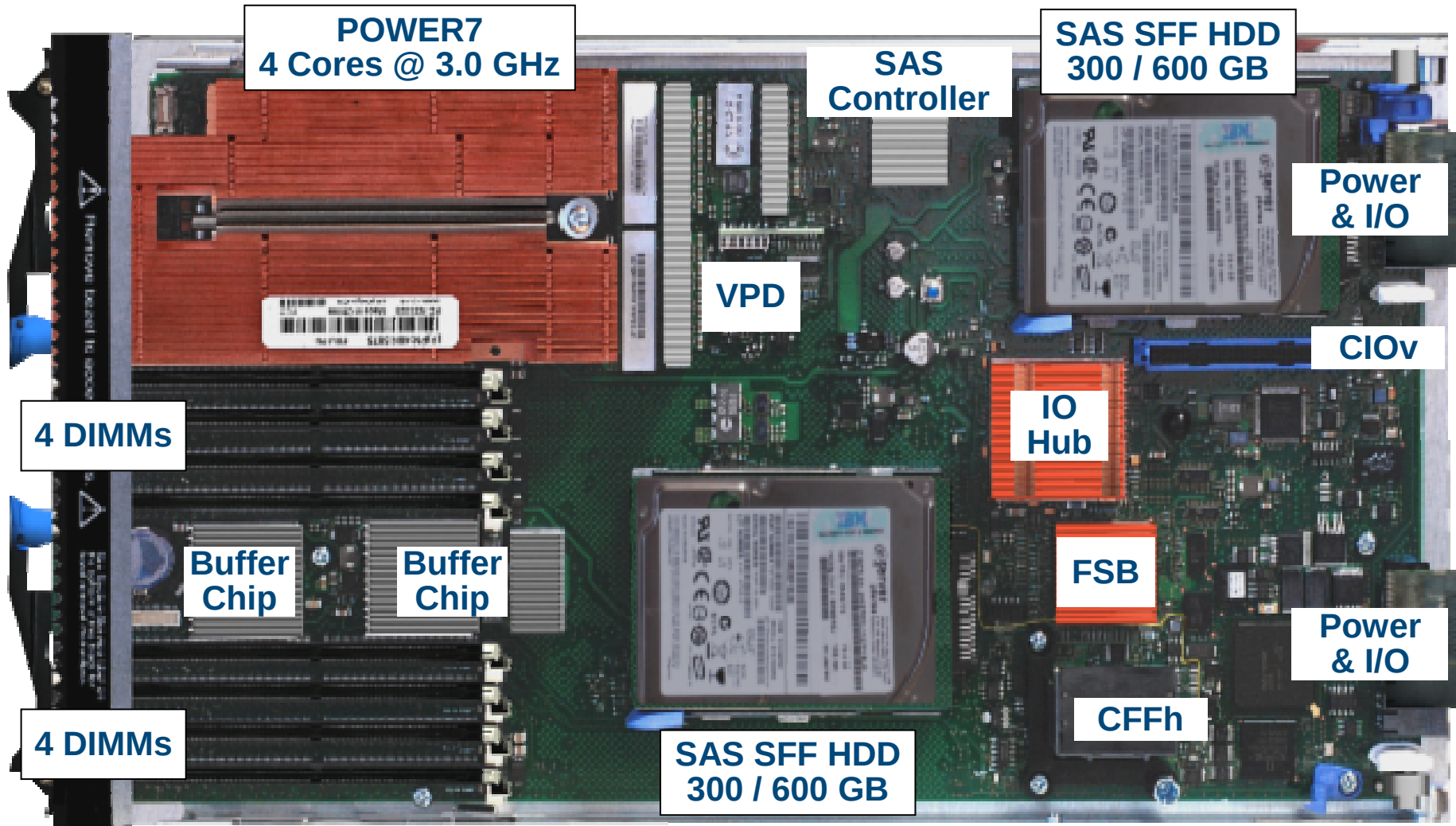
POWER7 PS700 Blade 4 Cores



Architecture	4 Core Single Socket
L2 & L3 Cache	On-Chip
DDR3 Memory	Up to 64 GB in 8 DIMMs
DASD / Bays	0 - 2 SAS (300/600GB)
Daughter Card Options	CIOv & CFFh (PCIe Adapters)
Integrated Features	Dual Port Gb Ethernet, USB

Fibre Support	Optional
Media Bays	1 BladeCenter
Redundant Power	Yes BladeCenter
Redundant Cooling	Yes BladeCenter
Service Processor	Yes
Power & Thermal	Power Save / Power Cap

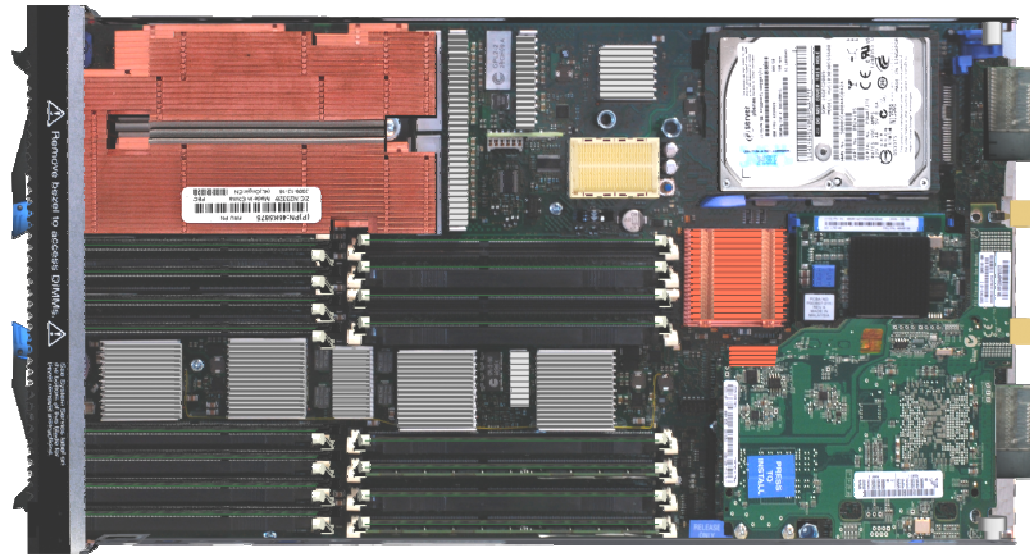
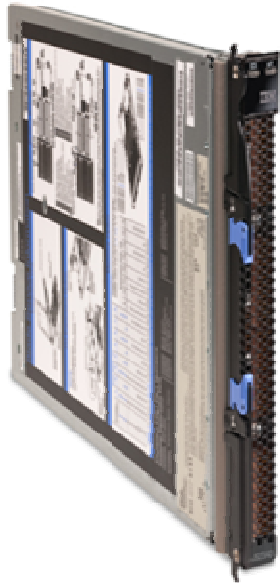
PS700 Layout



VPD = Vital Product Data

FSB = Service Processor

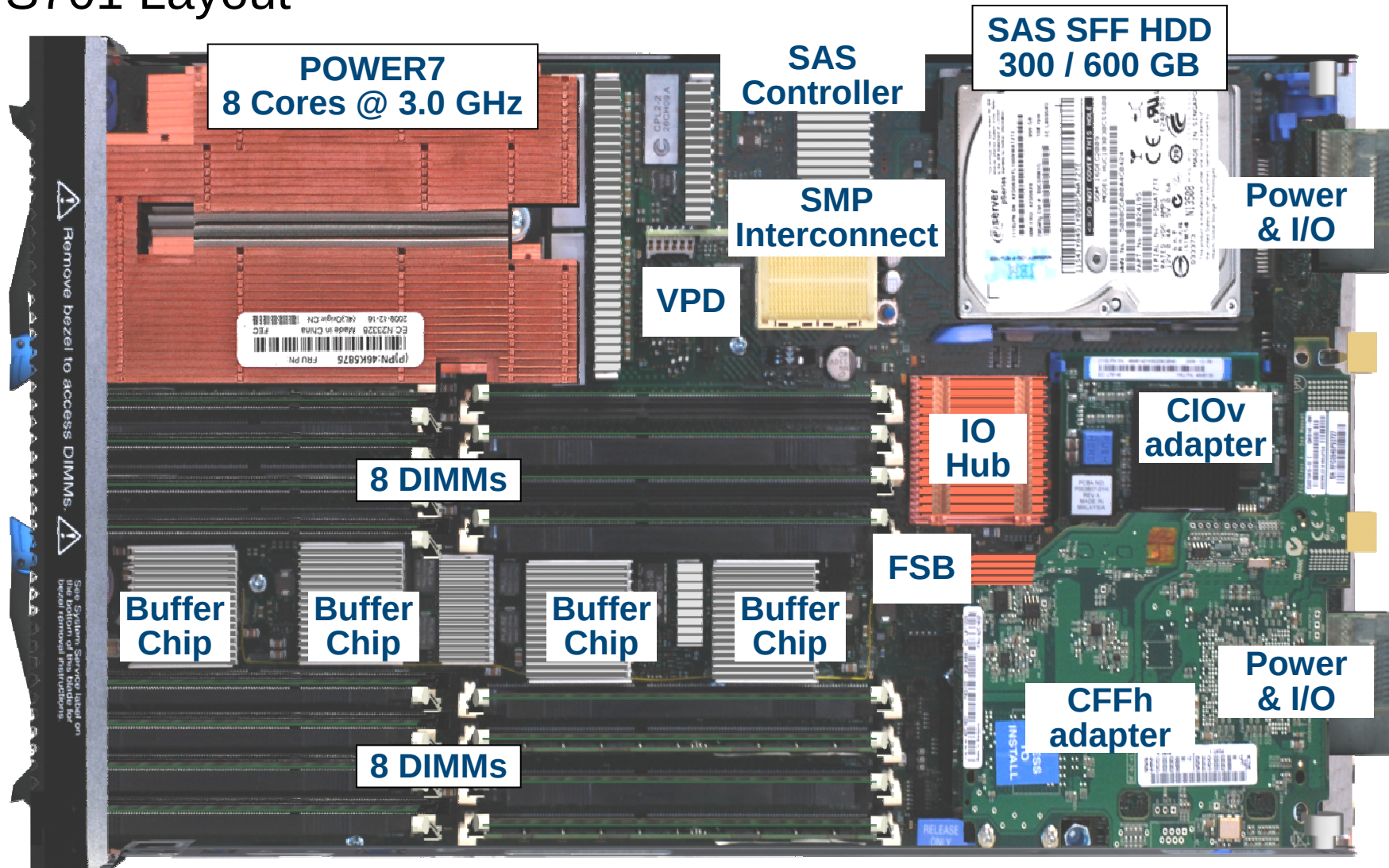
POWER7 PS701 Blade 8 Cores



Architecture	8 Core Single Socket
L2 & L3 Cache	On-Chip
DDR3 Memory	Up to 128 GB in 16 DIMMs
DASD / Bays	0 - 1 SAS (300/600GB)
Daughter Card Options	CIOv & CFFh (PCIe Adapters)
Integrated Features	Dual Port Gb Ethernet, USB

Fibre Support	Optional
Media Bays	1 BladeCenter
Redundant Power	Yes BladeCenter
Redundant Cooling	Yes BladeCenter
Service Processor	Yes
Power & Thermal	Power Save / Power Cap

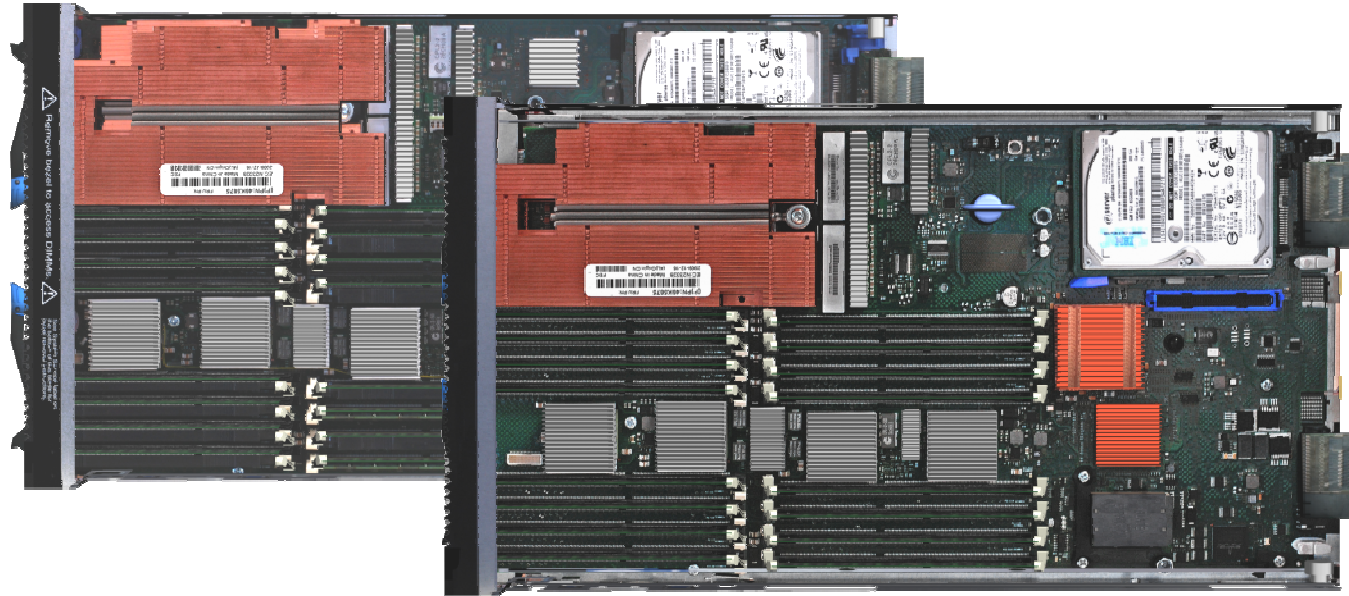
PS701 Layout



VPD = Vital Product Data

FSB = Service Processor

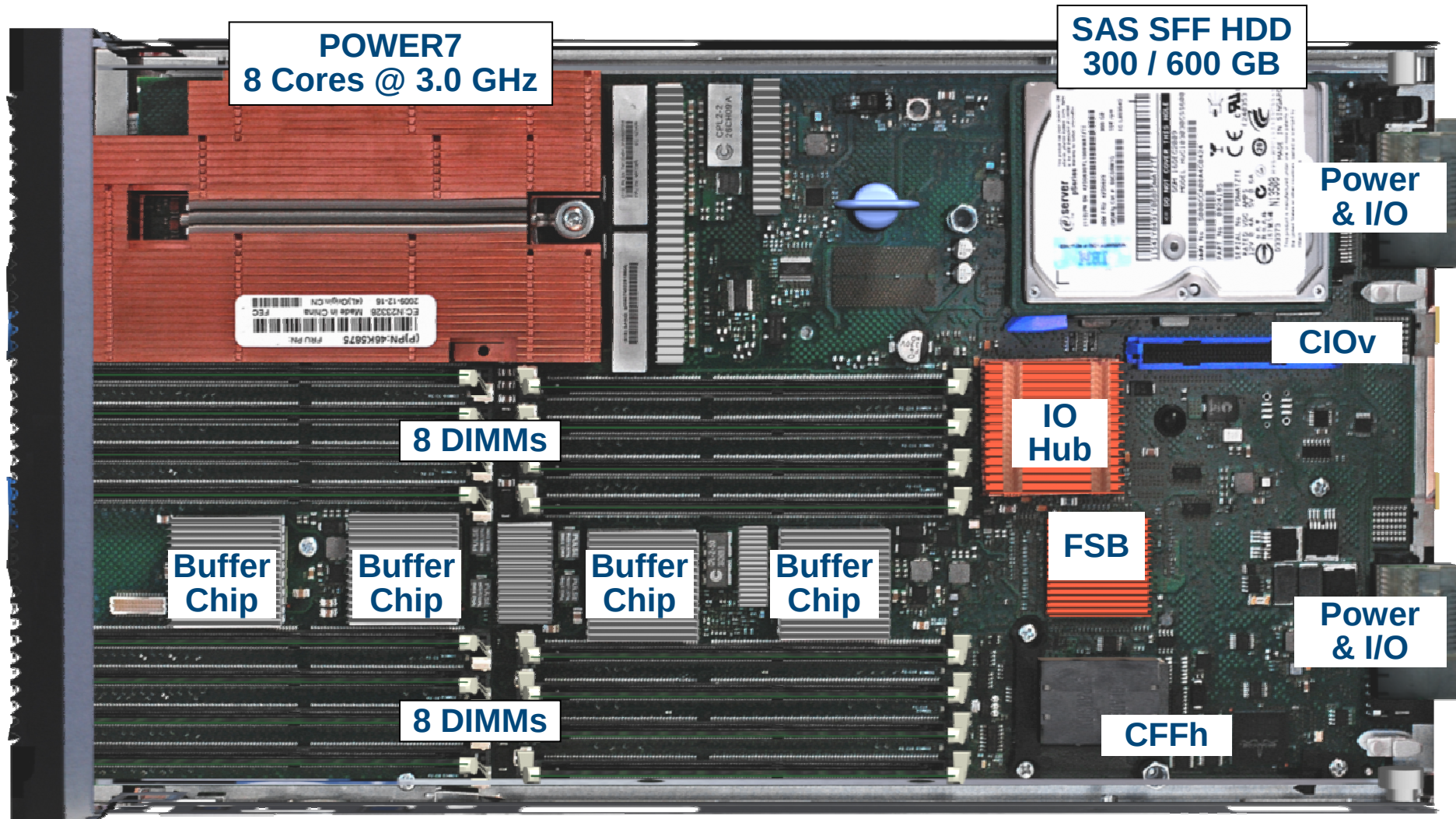
POWER7 PS702 Blade 16 Cores



Architecture	8 Cores/Socket Two Socket
L2 & L3 Cache	On-Chip
DDR3 Memory	Up to 256 GB in 32 DIMMs
DASD / Bays	0 - 2 SAS (300/600GB)
Daughter Card Options	CIOv & CFFh (PCIe Adapters)
Integrated Features	Dual Port Gb Ethernet, USB

Fibre Support	Optional
Media Bays	1 BladeCenter
Redundant Power	Yes BladeCenter
Redundant Cooling	Yes BladeCenter
Service Processor	Yes
Power & Thermal	Power Save / Power Cap

PS702 Layout (top half)



FSB = Service Processor

PS700 / PS701 / PS702 Components

■ Adapters / CIOv

- FC #8240 Emulex 8Gb Fibre Channel Expansion Card (CIOv)
- FC #8241 QLogic 4 Gb Fibre Channel Expansion Card (CIOv)
- FC #8242 QLogic 8Gb Fibre Channel Expansion Card (CIOv)
- FC #8246 3 Gb SAS Passthrough Expansion Card (CIOv)

■ Adapters / CFFh

- FC #8252 QLogic Ethernet and 4 Gb Fibre Channel Expansion Card
- FC #8258 4x DDR IB Expansion Card (CFFh)
- FC #8271 QLogic 8 Gb Fibre Channel Expansion Card (CFFh)
- FC #8275 QLogic 2-port 10Gb Converged Network Adapter (CFFh)
- TC #8298 Voltaire 4x DDR IB Expansion Card (CFFh)

■ Disk

- FC #8274 IBM 300GB SAS 10K RPM SFF HDD
- FC #8276 IBM 600GB SAS 10K RPM SFF HDD

■ Memory

- FC #8208 8GB (2x4GB DIMMs) DDR3 1066 MHz System Memory
- FC #8209 16GB (2 x 8GB DIMMs) DDR3 800 MHz System Memory

Operating System Support

■ AIX

- AIX V5.3 with the 5300-12 Technology Level, or later
- AIX V6.1 with the 6100-05 Technology Level, or later

■ IBM i

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

■ Linux

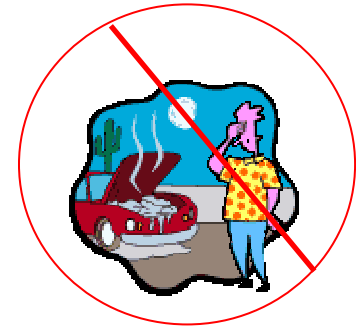
- SUSE Linux Enterprise Server 10 Service Pack 3 for POWER , or later with current maintenance updates available from Novell to enable all planned functionality
- Red Hat Enterprise Linux 5.5 for POWER, or later

■ VIOS:

- VIOS 2.1.3.0, or later
- VIOS is required with the IBM i operating system

Power Blades with Mainframe-inspired RAS features

***IBM POWER
processor based
blade servers***



- ✓ ***First Failure Data Capture***
- ✓ ***Processor Instruction Retry with Alternate Processor Recovery***
- ✓ ***Chipkill and Bit Steering***
- ✓ ***I/O EEH***
- ✓ ***FW isolated partitions***
- ✓ ***Partition Availability priority***
- ✓ ***Live Partition Mobility & Application Mobility***

POWER7 Innovations available with new PS Power Blades

Same or similar features to Mid-range Power Servers



Technology / Performance

- Options for 4-core and 8-cores per socket
- Support for up to 128GB DDR3 memory per blade
- Dual memory controllers for increased memory bandwidth
- eDRAM technology for on-chip L3 cache



Workload Optimizing Features for Added Flexibility

- IntelliThreads™ technology dynamically switches the processor threading mode to deliver optimal performance for different workloads



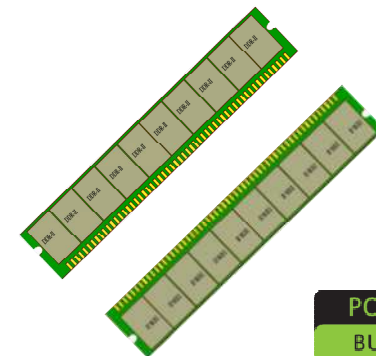
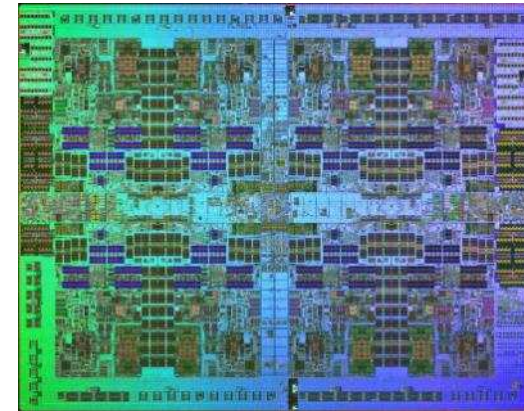
Availability

- Systems Management Alerts
- Auto reboot on power loss
- Hot Swap Power Blades in BladeCenter Chassis



Dynamic Energy Optimization

- EnergyScale Technology with dynamic energy optimization
- TPMD chip for thermal/energy monitoring and control
- Frequency reduction during low demand for energy reduction



IBM BladeCenter POWER Blade Portfolio

JS12 Express



- 3.8 GHz POWER6 3.8GHz
- 2-core (1 Socket x 2 Cores)
- Single Wide Form Factor
- Up to 64GB DDR2 Chipkill Memory
- PowerVM™ (std)
- Two SAS Disk drives (opt)
- Fibre, Ethernet, SAS Adapters

Entry / Small and Medium Business

Value offering with Extended Memory and Local Storage; ideal for rack-to-blade transition and consolidation of IBM i with x86

JS23/JS43 Express



- 4.2 GHz POWER6 4.2GHz
- 4/8-core (2/4 Sockets)
- PowerVM™ (std)

Scalable Value / Performance

Designed for commercial UNIX applications, targets virtualization/consolidation opportunities with Power Systems scale-as-you-grow modularity.

PS700/701/702 Express



- 4/8/16-core (1/2 Sockets)
- Single Wide non-Scalable
- Single Wide Scalable
- Double Wide / Performance

Demanding Scalable Enterprise Performance

Designed for demanding commercial UNIX applications, ideal solution for database serving or multi-tiered environments, targets virtualization/consolidation opportunities with Power Systems scale-as-you-grow modularity.



BladeCenter PS Blade Overview

Enhances most popular blades for UNIX* with 3 New Offerings!

	IBM BladeCenter PS700 Express	IBM BladeCenter PS701 Express	IBM BladeCenter PS702 Express
Architecture	POWER7 4-Core (1 Socket x 4 Cores per blade) Single Wide	POWER7 8-core (1 Socket x 8 Cores per blade) Single Wide	POWER7 16-core (1 Socket x 8 Cores per blade) Double Wide
Memory	4GB to 64GB DDR3 (Chipkill) 4GB@1066MHz, 8GB@800MHz	4GB to 128GB DDR3 (Chipkill) 4GB@1066MHz, 8GB@800MHz	4GB to 256GB DDR3 (Chipkill) 4GB@1066MHz, 8GB@800MHz
DASD / Bays	0-2 SAS disk	0-1 SAS disk	0-2 SAS disk
Expansion Card Slots	1 PCI-E CIOv Expansion Card 1 PCI-E CFFh ExpansionCard	1 PCI-E CIOv Expansion Card 1 PCI-E CFFh ExpansionCard	2 PCI-E CIOv Expansion Card 2 PCI-E CFFh ExpansionCard
Integrated Features	Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB	Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB	Keyboard, Video and Mouse Quad Port 1Gb Ethernet SAS Controller USB
Scalability Support	No	Yes – Factory or Customer Upgrade	Yes – Factory or Customer Upgrade
Fibre Support	Yes (via BladeCenter Chassis)	Yes (via BladeCenter Chassis)	Yes (via BladeCenter Chassis)
Redundant Power	Yes (via BladeCenter Chassis)	Yes (via BladeCenter Chassis)	Yes (via BladeCenter Chassis)
Redundant Cooling	Yes (via BladeCenter Chassis)	Yes (via BladeCenter Chassis)	Yes (via BladeCenter Chassis)
Service Processor	FSP1 (IPMI, SOL)	FSP1 (IPMI, SOL)	FSP1 (IPMI, SOL)
Virtualization	IBM PowerVM (optional Editions)	IBM PowerVM (optional Editions)	IBM PowerVM (optional Editions)
Systems Management	IBM Director and CSM IBM EnergyScale Technology	IBM Director and CSM IBM EnergyScale Technology	IBM Director and CSM IBM EnergyScale Technology
OS Support	AIX, i, Linux	AIX, i, Linux	AIX, i, Linux
BladeCenter Chassis Support	BCE, BCH*, BCHT, BCT, BCS* * In Power Systems Channel	BCH*, BCHT, BCS* * In Power Systems Channel	BCH*, BCHT, BCS* * In Power Systems Channel

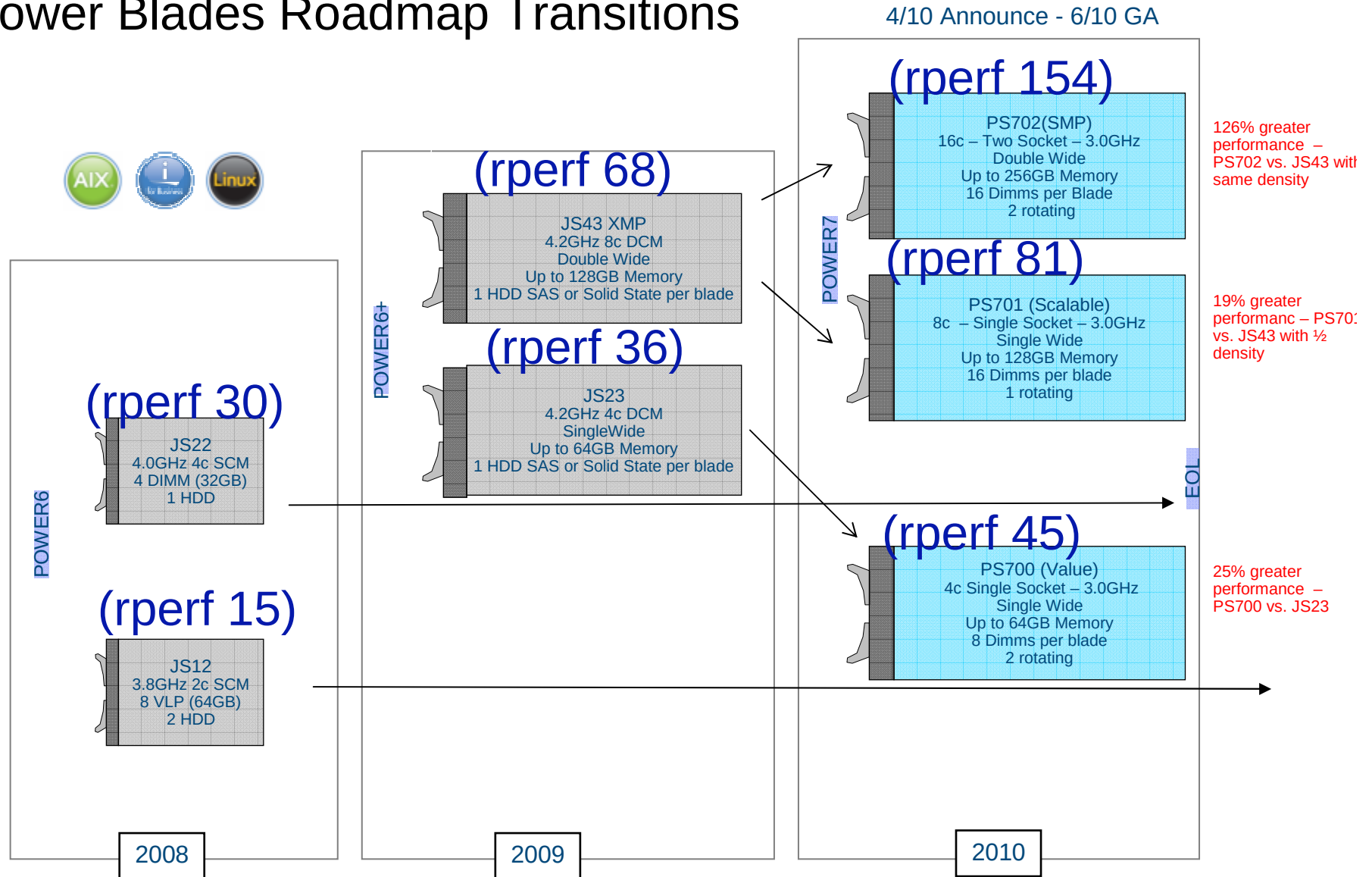
* IDC 4Q2009 Server Tracker RISC/Itanium blades

IBM BladeCenter JS12, JS22, JS23 and JS43 Express

The broadest and most flexible range of POWER6 blades in the world!

	BladeCenter JS12 Express	BladeCenter JS22 Express	BladeCenter JS23 Express	BladeCenter JS43 Express
Architecture	3.8 GHz POWER6 SCM 2-core (1 Socket x 2 Cores) Single Wide	4.0 GHz POWER6 SCM 4-core (2 Socket x 2 Cores) Single Wide	4.2GHz POWER6 DCM 4 core (2 Socket x 2 cores) Single Wide	4.2GHz POWER6 DCM 8-core (4 Socket x 2 cores) Double Wide
Memory	4GB to 64 GB DDR2 (Chipkill)	4GB to 32 GB DDR2 (Chipkill)	4GB to 64GB DDR2 (Chipkill)	8GB to 128GB DDR2 (Chipkill)
DASD / Bays	0-2 SAS disk (73 or 146 GB)	0-1 SAS disk (73 or 146 GB)	0-1 SAS disk (73,146 or 300GB) or 0-1 Solid State (69GB)	0- 2 SAS disk (73 ,146 or 300GB) or 0-2 Solid State (69GB)
Daughter Cards	Legacy, SFF or High speed DC	Legacy, SFF, or High speed DC	1 PCI-E CIOv Expansion Card 1 PCI-E CFFh High Speed Expansion Card	2 PCI-E CIOv Expansion Card 2 PCI-E CFFh High Speed Expansion Card
Integrated Features	Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB	Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB	Keyboard, Video and Mouse Dual Port 1Gb Ethernet SAS Controller USB	Keyboard, Video and Mouse Quad Port 1Gb Ethernet SAS Controller USB
Fibre Support	Yes (via BladeCenter)	Yes (via BladeCenter)	Yes (via BladeCenter)	Yes (via BladeCenter)
Redundant Power	Yes (via BladeCenter)	Yes (via BladeCenter)	Yes (via BladeCenter)	Yes (via BladeCenter)
Redundant Cooling	Yes (via BladeCenter)	Yes (via BladeCenter)	Yes (via BladeCenter)	Yes (via BladeCenter)
Service Processor	FSP1 (IPMI, SOL)	FSP1 (IPMI, SOL)	FSP1 (IPMI, SOL)	FSP1 (IPMI, SOL)
Virtualization	PowerVM Standard Edition built-in	PowerVM Standard Edition built-in	PowerVM Standard Edition built-in	PowerVM Standard Edition built-in
Systems Management	IBM Director and CSM IBM EnergyScale Technology	IBM Director and CSM IBM EnergyScale Technology	IBM Director and CSM IBM EnergyScale Technology	IBM Director and CSM IBM EnergyScale Technology
OS Support	AIX, i, Linux	AIX, i, Linux	AIX, i, Linux	AIX, i, Linux
rPerf	14.37	30.26	4W = 36.28	8W = 68.20
CPW	7100	13800	14,400	24,050
BladeCenter Chassis Support	BCE, BCH, BCHT, BCT, BCS	BCH, BCHT, BCS	BCH, BCHT, BCS	BCH, BCHT, BCS

Power Blades Roadmap Transitions



Superior Virtualization with POWER7 Blades and PowerVM

Cost-Effective, High-Performance and Scalable Virtualization

- PowerVM is the hardware-based virtualization solution used on more than 60% of IBM Power Systems servers and blades
- Available in three Editions to suit broad range of client needs
- Runs virtualized AIX, IBM i, Linux/Power and Linux/x86 workloads
- Virtualization performance and scalability superior to x86 blades

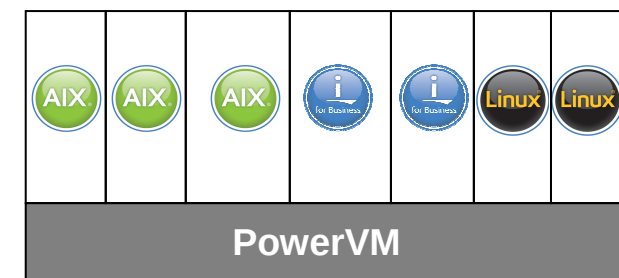
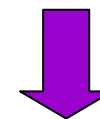
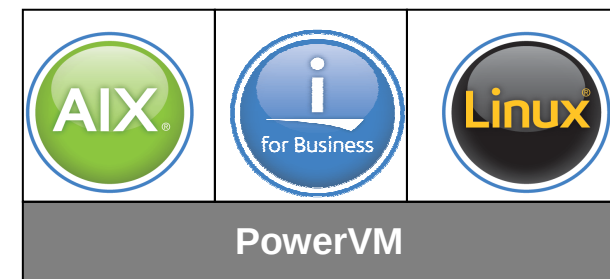
- PowerVM helps clients:
 - Reduce costs
 - Improve service levels
 - Manage risk



<i>Virtualization Scalability</i>	VMware vSphere (on 2-socket Nehalem blade)	PowerVM (on POWER7 blade)
Virtual CPUs per VM	8	16
CPU threads per blade	32	64
Micro-partitioning granularity to .01	No	Yes
Dynamic virtualized I/O	No	Yes
Cross-platform virtualization	No	Yes (PowerVM Lx86)

Workload consolidation with PowerVM virtualization reduces costs

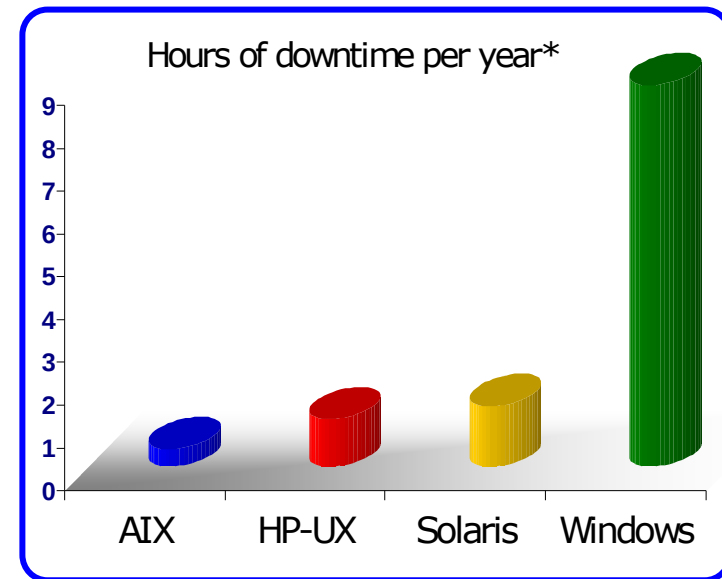
- PowerVM enables unrivaled **consolidation** of multiple AIX, IBM i and Linux workloads, allowing clients to:
 - *Reduce infrastructure costs*: less datacenter and rack space, less cabling
 - *Reduce utility costs*: less energy and cooling
 - *Reduce operational costs*: faster provisioning, simpler scaling and easier recoverability
- PowerVM delivers these benefits through innovative technology that optimizes physical resources:
 - Micro-partitioning enables most efficient use of available cores, with 1/100th of a core granularity
 - Multiple shared processor pools
 - Dynamic movement of virtualized processor and I/O resources (in VIOS) based on workload activity
- Next innovation: Extend resource optimization to include memory → with Active Memory Sharing



AIX is “Most Reliable”

According to a recent Yankee Group study* of 400 Windows, Linux and UNIX users, AIX was the most reliable server operating system:

“IBM’s AIX achieved the highest level of reliability, with corporate enterprises reporting an average of only 36 minutes of downtime per server in a 12-month period”



* Source: “Unix, Linux Uptime and Reliability Increase; Patch Management Woes Plague Windows”
© 2008 Yankee Group Research, Inc. All rights reserved

Simplify Linux installation on Power Systems



Preinstall Linux on Power Blades through Power 780

Save time and leverage IBM expertise by allowing IBM to install Linux for you in the factory prior to shipping the server

- Provides support for POWER6 running SLES 10 and 11
- adds support for POWER7 blades through Power 780 (excludes Power 755 HPC server)

New!

IBM Installation Toolkit for Linux v4.1 (GA outlook June 2010)

Provides a set of tools that significantly simplifies the installation of Linux on IBM Power Systems

- Provides support for POWER6 running SLES 10 SP2 & SP3, SLES 11, RHEL 4.7 & 4.8, and RHEL 5.4
- adds support for POWER6 RHEL 5.5
- adds support for POWER7 running SLES 10 SP3, SLES 11, and RHEL 5.5
- adds support for PowerVM Lx86 V1.4

New!

Free download, Free support...

<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/installtools/home.html>

Sustained IBM BladeCenter Investment for IBM i

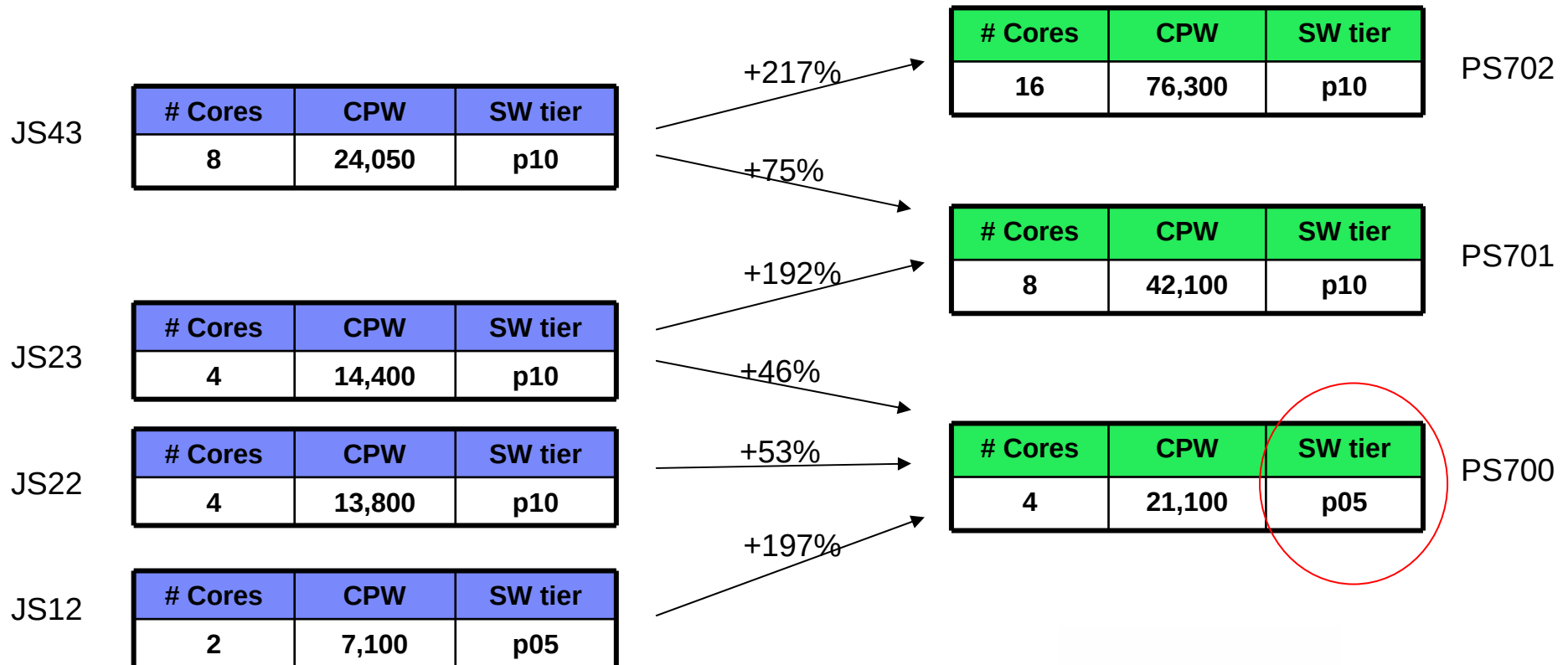
2008	2009	2010
▪ Blade introduced for IBM i ▪ JS12 2-core ▪ Support for BladeCenter H, S ▪ Pre-install on BladeCenter S ▪ DS4000 ▪ DS8000 ▪ LTO3 LTO4 Tapes ▪ DS3200 ▪ DS3400 ▪ SVC	▪ JS23 and JS43 ▪ Virtual Tape ▪ RAID SAS Switch ▪ DS5000 ▪ XIV ▪ i Edition with RAID and IBM i pre-install ▪ NPIV support for tape libraries ▪ DS8700 ▪ DS5020	▪ PS700, PS701, PS702 ▪ Improved performance and energy efficiency



IBM i performance on POWER7 blades

Performance and Energy Efficiency

- More performance per core
- More performance per blade



Enhanced i Edition Express for BladeCenter S

- **Providing a dynamic IT infrastructure for mid-sized customers**
 - Integrates i and Windows blades plus storage, networking, into a single chassis
 - POWER6 processor-based blade for IBM i
 - Supports consolidation of x86 servers with VMware
- **Bringing the best of i and BladeCenter together**
 - BladeCenter JS12 delivers performance for i applications
 - Pre-installation of IBM i and VIOS reduces time and skills required to get started
 - Built-in PowerVM™ virtualization
- **Priced less than a 520 system**
 - Priced below a Power 520 1-core and less than **HALF** the price of a Power 520 1 of 2-core server
 - Lease payment potentially less than monthly maintenance payments on existing System i server
- **BladeCenter S, a new IT foundation**
 - Six slots for Power and x86 processor-based blades
 - 5.4 TBs of integrated storage in chassis
 - Office-ready with quiet operation, standard office power



i Edition Express for BladeCenter S

- ✓ BladeCenter JS12 base configuration for i
- ✓ IBM i processor entitlement, 1yr SWMA, 10 users
- ✓ BladeCenter S chassis optimized for i

New support for

- ✓ Direct backup to TS2240 LTO-4 tape drive
- ✓ Simplified migration from towers/racks to blades
- ✓ RAID SAS Switch for more protection options
 - Attachment of DS3200 for additional storage
 - IBM i preinstalled with Non RAID Switch configs

IBM i Support for Virtual Tape

- **Virtual tape support enables IBM i partitions to directly backup to PowerVM VIOS attached tape drive**
 - Saves hardware costs and management time
- **Simplifies backup and restore processing with BladeCenter implementations**
 - IBM i 6.1 partitions on BladeCenter JS12, JS22, JS23, JS43
 - Supports IBM i save/restore commands & BRMS
 - Supports BladeCenter S and H implementations
- **Simplifies migration to blades from tower/rack servers**
 - LTO-4 drive can read backup tapes from LTO-2, 3, 4 drives
- **Supports IBM Systems Storage SAS LTO-4 Drive**
 - TS2240 for BladeCenter and Power Servers
 - 7214 Model 1U2 with FC#1404, and FC#5720 DVD/Tape SAS External Storage Unit with FC#5746 for Power servers
- **Requirements**
 - VIOS 2.1.1, eFW 3.4.2, IBM i 6.1 PTFs



Reduce Costs with IBM i and BladeCenter



Migrating From	To	Monthly Maintenance Savings	Monthly Power Savings	Monthly SWMA Savings	Total Monthly Savings	% of Lease Payment Covered
270-2250	520 1-core	\$177		\$294	\$471	175%
720-2061	520 1-core	\$154	\$55	\$294	\$503	187%
800-7408	i Edition BCS	\$275		\$294	\$569	193%
810-7406	i Edition BCS	\$325		\$294	\$619	210%
820-2396	520 1-core	\$370	\$6	\$922	\$1298	272%

IBM i Economic Replacement Tool

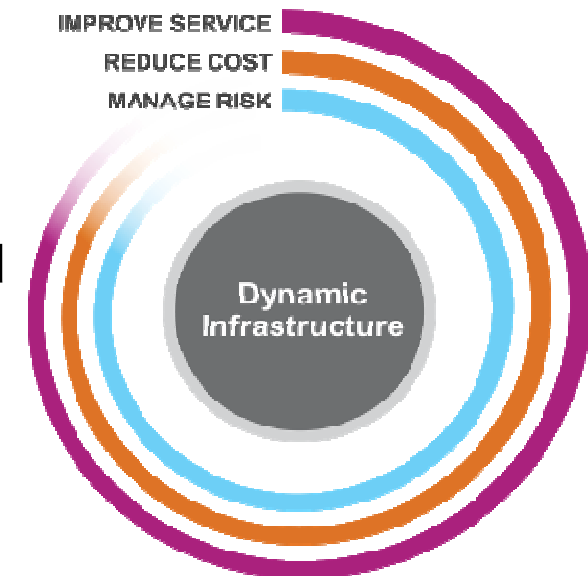
IBM

BP <http://www-304.ibm.com/jct09002c/partnerworld/wps/servlet/ContentHandler/igrowtooladvanced>

Power your planet.

IBM BladeCenter helps deliver a dynamic infrastructure

- Reduce operating costs with higher performance, simplified management, and increased utilization
- Manage present and future risk in challenging economic conditions with best-in-class RAS and future-proof IT
- Improve service with an end-to-end approach to systems management



**Delivering superior business
and IT services with
agility and speed.**

BACKUP INFORMATION

Notes to presenter

REQUIRED CHARTS

The presenter must display the *Special Notices* chart, the *Notes on Benchmarks and Values* charts (if the referenced values are given), and the *Notes on Performance Estimates* chart (if the referenced performance estimates are given) during the course of the presentation. Any printed copies of this presentation that are distributed must include legible copies of these charts. If printed copies are not distributed, the attendees must be offered the option to receive legible printed copies of these charts.

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Please review the *Special Notices* page prior to updating this presentation to ensure all trademarks used are given proper attribution.

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This presentation may contain speaker notes available imbedded or as a separate file. Please ensure these are utilized if available.

Revised January 9, 2003

Substantiation Chart

- SPEC® and the benchmark names SPECrate®, SPECint®, and SPECjbb® are registered trademarks of the Standard Performance Evaluation Corporation. For the latest SPEC benchmark results, visit <http://www.spec.org>. All results are the best result posted at www.spec.org as of April 5, 2010 for the system indicated except for the IBM BladeCenter result which was submitted to SPEC on April 12, 2010.
- HP prices from Aquila Technology Website at <http://www.aquilatech.co.nz/>
- Sun T6340 energy usage and performance density based on use in Sun Blade 6048 chassis. Maximum energy requirement and space requirement from the Sun Blade 6048 Chassis Datasheet available through www.oracle.com. All data current as of April 5, 2010.

SPECint_rate2006 results as of April 5, 2010						
System Name	Cores	Chips	Cores / Chip	Threads / Core	Peak	Peak / Core
IBM BladeCenter PS702	16	2	8	4	520	32.5
HP Integrity BL860c i2	8	2	4	2	134	16.7
Sun Blade T6340	16	2	8	8	160	10.0

SPECfp_rate2006 Results as of April 5, 2010						
System Name	Enabled Cores	Enabled Chips	Cores / Chip	Threads / Core	Peak Result	Peak / Core
IBM BladeCenter PS702	16	2	8	4	431	26.9
HP Integrity BL860c i2	8	2	4	2	136	17.0
Sun Blade T6340 Server	16	2	8	8	121	7.5

SPECjbb2005 results as of April 5, 2010							
HW System Name	JVM Instances	Cores	Chips	HW Threading	bops	bops/JVM	bops / core
IBM BladeCenter PS702		16	2	Yes	1,119,946		69,997
Sun Blade T6340	16	16	2	Yes	388,456	24,279	24,278

Lower TCA Substantiation

- Performance based on IBM analysis of benchmarks on 2.93GHz X5600 processors and benchmarks on the PS702
- Prices from www.hp.com
- Assumption is that the IBM BladeCenter PS702 will be 60% utilized with PowerVM as the virtualization technology and the HP ProLiant BL460c G6 will be 40% utilized with VMware as the virtualization technology

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Notes on benchmarks and values

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IBM benchmark results can be found in the IBM Power Systems Performance Report at http://www.ibm.com/systems/p/hardware/system_perf.html.

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, AIX Version 4.3, AIX 5L or AIX 6 were used. All other systems used previous versions of AIX. The SPEC CPU2006, SPEC2000, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C Enterprise Edition V7.0 for AIX, XL C/C++ Enterprise Edition V7.0 for AIX, XL FORTRAN Enterprise Edition V9.1 for AIX, XL C/C++ Advanced Edition V7.0 for Linux, and XL FORTRAN Advanced Edition V9.1 for Linux. The SPEC CPU95 (retired in 2000) tests used preprocessors, KAP 3.2 for FORTRAN and KAP/C 1.4.2 from Kuck & Associates and VAST-2 v4.01X8 from Pacific-Sierra Research. The preprocessors were purchased separately from these vendors. Other software packages like IBM ESSL for AIX, MASS for AIX and Kazushige Goto's BLAS Library for Linux were also used in some benchmarks.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

TPC	http://www.tpc.org
SPEC	http://www.spec.org
LINPACK	http://www.netlib.org/benchmark/performance.pdf
Pro/E	http://www.proe.com
GPC	http://www.spec.org/gpc
VolanoMark	http://www.volano.com
STREAM	http://www.cs.virginia.edu/stream/
SAP	http://www.sap.com/benchmark/
Oracle Applications	http://www.oracle.com/apps_benchmark/
PeopleSoft - To get information on PeopleSoft benchmarks, contact PeopleSoft directly	
Siebel	http://www.siebel.com/crm/performance_benchmark/index.shtml
Baan	http://www.ssaglobal.com
Fluent	http://www.fluent.com/software/fluent/index.htm
TOP500 Supercomputers	http://www.top500.org/
Ideas International	http://www.ideasinternational.com/benchmark/bench.html
Storage Performance Council	http://www.storageperformance.org/results

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Notes on HPC benchmarks and values

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IBM benchmark results can be found in the IBM Power Systems Performance Report at http://www.ibm.com/systems/p/hardware/system_perf.html.

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, AIX Version 4.3 or AIX 5L were used. All other systems used previous versions of AIX. The SPEC CPU2000, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C Enterprise Edition V7.0 for AIX, XL C/C++ Enterprise Edition V7.0 for AIX, XL FORTRAN Enterprise Edition V9.1 for AIX, XL C/C++ Advanced Edition V7.0 for Linux, and XL FORTRAN Advanced Edition V9.1 for Linux. The SPEC CPU95 (retired in 2000) tests used preprocessors, KAP 3.2 for FORTRAN and KAP/C 1.4.2 from Kuck & Associates and VAST-2 v4.01X8 from Pacific-Sierra Research. The preprocessors were purchased separately from these vendors. Other software packages like IBM ESSL for AIX, MASS for AIX and Kazushige Goto's BLAS Library for Linux were also used in some benchmarks.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

SPEC	http://www.spec.org
LINPACK	http://www.netlib.org/benchmark/performance.pdf
Pro/E	http://www.proe.com
GPC	http://www.spec.org/gpc
STREAM	http://www.cs.virginia.edu/stream/
Fluent	http://www.fluent.com/software/fluent/index.htm
TOP500 Supercomputers	http://www.top500.org/
AMBER	http://amber.scripps.edu/
FLUENT	http://www.fluent.com/software/fluent/fl5bench/index.htm
GAMESS	http://www.msg.chem.iastate.edu/gamess
GAUSSIAN	http://www.gaussian.com
ANSYS	http://www.ansys.com/services/hardware-support-db.htm

Click on the "Benchmarks" icon on the left hand side frame to expand. Click on "Benchmark Results in a Table" icon for benchmark results.

ABAQUS	http://www.simulia.com/support/v68/v68_performance.php
ECLIPSE	http://www.sis.slb.com/content/software/simulation/index.asp?seg=geoquest&
MM5	http://www.mmm.ucar.edu/mm5/
MSC.NASTRAN	http://www.mssoftware.com/support/prod%5Fsupport/nastran/performance/v04_sngl.cfm
STAR-CD	www.cd-adapco.com/products/STAR-CD/performance/320/index/html
NAMD	http://www.ks.uiuc.edu/Research/namd
HMMER	http://hmmer.janelia.org/
	http://powerdev.osuosl.org/project/hmmerAltivecGen2mod

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Notes on performance estimates

rPerf for AIX

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- rPerf estimates are calculated based on systems with the latest levels of AIX and other pertinent software at the time of system announcement. Actual performance will vary based on application and configuration specifics. The IBM eServer pSeries 640 is the baseline reference system and has a value of 1.0. Although rPerf may be used to approximate relative IBM UNIX commercial processing performance, actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration. Note that the rPerf methodology used for the POWER6 systems is identical to that used for the POWER5 systems. Variations in incremental system performance may be observed in commercial workloads due to changes in the underlying system architecture.

All performance estimates are provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, and application sizing guides to evaluate the performance of a system they are considering buying. For additional information about rPerf, contact your local IBM office or IBM authorized reseller.

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CPW for IBM i

Commercial Processing Workload (CPW) is a relative measure of performance of processors running the IBM i operating system. Performance in customer environments may vary. The value is based on maximum configurations. More performance information is available in the Performance Capabilities Reference at: www.ibm.com/systems/i/solutions/perfmgmt/resource.html

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