Windows: Making the Move to Itanium

March 2004

Highlights of HP server announcements

- HP furthers deployment of Itanium® processors in both our Integrity and NonStop lines of servers
  - HP Integrity servers deliver the 'fastest computing on the planet'
  - Provides scale-up capability for Windows, Linux, HP-UX and OpenVMS from 1 to 128 processors and scale-out capability across thousands of nodes
  - NonStop operating system has now booted on Itanium-based processors as part of the move of fault tolerant computing to the Itanium architecture
- HP will incorporate x86 processors with 64-bit extension technology from AMD® and Intel® across our full ProLiant server line, which offers our x86 customers:
  - Improved 32-bit performance and price/performance for 1-8P servers
  - 64-bit addressing, breaking the 4GB memory limit
  - Accelerates the adoption and deployment of 64-bit environment of Itanium

HP continues to deliver industry standard computing across all tiers of the data center

What this means to you

- HP is leading the way with 64-bit computing

- HP's commitment to industry standards provides the ideal foundation for an adaptive enterprise

- HP is the market leader in industry standard solutions with x86 and Itanium processors

- HP's Itanium strategy holds true: Itanium is HP's strategic 64-bit enterprise computing platform

- Responding to customer demands, HP will support a new generation of x86 processors as part of the ProLiant server portfolio including new ProLiant servers with Opteron technology and Intel with extensions

Addressing your questions

- Does this change HP's industry standard server strategy?

- What does this mean to the positioning of HP Integrity and ProLiant servers?

- Does this change HP's Itanium® processor strategy?

- Will this affect market acceptance of Itanium processors?
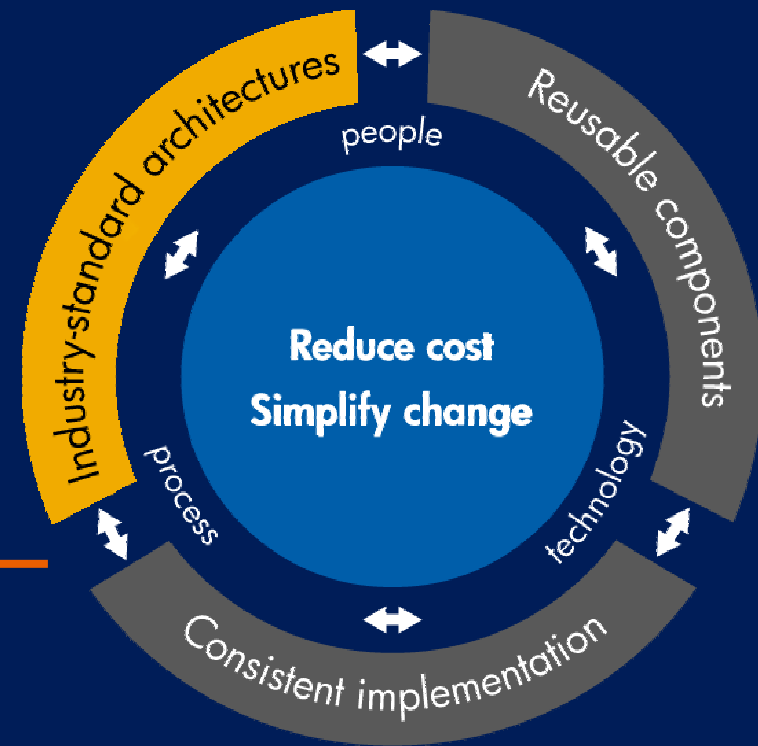
Adaptive Enterprise vision

Business and IT synchronized to capitalize on change

Business

Information technology

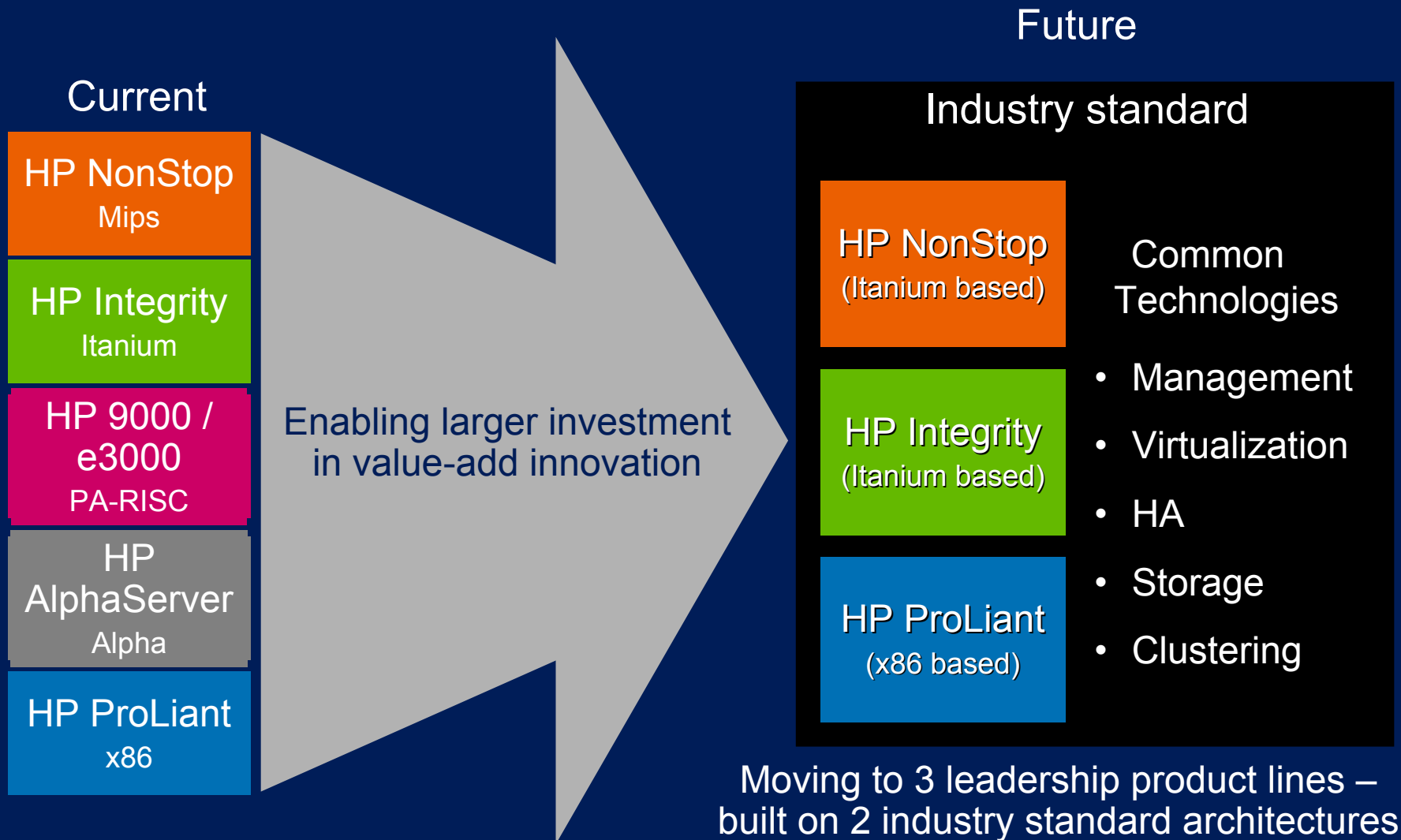# An adaptive enterprise starts with standards

HP is:

- Committed to providing the best in industry standard components

- Providing more customer choice without compromise

- Investing in industry standards and focused innovation

x86   Itanium

Industry standard architectures

Industry-standard architectures

Reusable components

Consistent implementation

people

process

technology

Reduce cost

Simplify change

Complementary, modular approach based on two standard architectures

HP's industry standards-based server strategy

Current

HP NonStop — Mips	
HP Integrity — Itanium	
HP 9000 / e3000 — PA-RISC	
HP AlphaServer — Alpha	
HP ProLiant — x86	

Enabling larger investment in value-add innovation

Future

Industry standard

HP NonStop (Itanium based)

HP Integrity (Itanium based)

HP ProLiant (x86 based)

Common Technologies

- Management
- Virtualization
- HA
- Storage
- Clustering

Moving to 3 leadership product lines – built on 2 industry standard architectures

Customers are driving the future of industry standard server architectures

Customer demands

- Growing market share indicates customers are deploying industry standard servers across the enterprise

- More mission critical capabilities
  - More Performance
  - More Reliability
  - More Scalability - across a unified product line
  - More Support for complex workloads
    - Data extensions beyond 32-bit
    - 64-bit computing

- Lower costs

The HP industry standard server family leads the industry – today and tomorrow

Responding to customer demand: HP will support new generations of Itanium and x86 processors

- ProLiant gets stronger: x86 extensions improves performance for memory bound applications

- Integrity is HP's strategic platform for 64-bit enterprise computing
  - Performance, scalability and reliability of Integrity servers delivers unique value for mission critical applications

- Adding AMD and Intel x86-based solutions are industry standard economics at work

- Positioning of Integrity and ProLiant servers remains the same

- Full ecosystem including seamless support

- Unprecedented investment protection

HP leadership delivers maximum value from industry standard technologies

From the planet's most powerful platforms
to the leading price:performance systems,
HP is at the forefront in Windows, Linux, and UNIX® computing

HP is #1 in WW market share:

- UNIX, Windows, and Linux systems

- x86-based servers

- Itanium-based servers

- Fault-tolerant systems

- High performance technical computing

Source: IDC

Customers win

- HP continues to lead the industry in meeting customer needs for choice, innovation and value

- Innovations from Intel® and AMD continue to improve performance for existing applications while x86 extensions accelerate pervasive 64-bit computing

- Combination of Integrity servers with Itanium processors and ProLiant systems with x86 extensions provide customers with superior flexibility and choice
  - Ultimate performance, scalability and availability for the most demanding apps

- Unprecedented choice for building an adaptive enterprise

HP is the only vendor committed to bringing industry standard architectures to all tiers of the data center

Addressing your questions

- Does this change HP's industry standard server strategy?

- What does this mean to the positioning of HP Integrity and ProLiant servers?

- Does this change HP's Itanium® processor strategy?

- Will this affect market acceptance of Itanium processors?

HP is uniquely positioned to deliver more

- Seamless 32/64-bit choice, innovation, and value
- Driving the future of standards across OS, application and platform
- Delivering the best choice of price:performance from scale-up to scale-out

Leading adaptive management	End-to-end, common storage integration	Proven enterprise solutions & partners	Unmatched 32/64-bit expertise, service and support

ProLiant	Integrity	NonStop
Leading x86 price:performance and value	Ultimate scalable performance and reliability	Bulletproof data integrity and instant data processing
1-8P Windows, Linux, NetWare	1-128P HP-UX, Windows, Linux, OpenVMS	Fault Tolerant NSK

HP extends its x86 offerings: More performance & choice with 100% compatibility

- Greater 32-bit performance

- ProLiant design consistency

- Transparent 32/64-bit capabilities

- 64-bit OS, tools and application development in early stages

New ProLiant servers with AMD Opteron™ technology
- ProLiant DL145: HPC 1U 2P server. Available 1Q'04
- ProLiant DL585: First 4P with 64GB RAM. Available 2Q'04
- ProLiant BLxxp: 2P performance & power efficiency. Blade portfolio announcements 3-4Q'04

Updated ProLiant servers with latest Xeon with extensions
- Updating current 1 to 2P Xeon-based ProLiant servers beginning mid-04
- Updating future 4 to 8P Xeon-based ProLiant servers mid-05

Breaking through memory constraints and accelerating 64-bit computing

- x86 with 64-bit capability helps meet the growing daily demands for greater compute power

- Business, government, and science continue the move toward 64-bit computing

- Next generation x86 fosters commercial ISV support for 64-bit data structures

- Itanium is the leading edge performance 64-bit architecture into the future

- Opteron is an evolution of the x86 architecture enabling 32-bit ecosystem to begin transition to 64-bit computing

Addressing your questions

- Does this change HP's industry standard server strategy?

- What does this mean to the positioning of HP Integrity and ProLiant servers?

- Does this change HP's Itanium® processor strategy?

- Will this affect market acceptance of Itanium processors?

Itanium® processors form the strategic architecture for 64-bit enterprise computing

- Itanium architecture is the logical successor to RISC
  - Top transaction processing performance and scalability for commercial enterprises
  - Industry leading floating point performance for engineers and scientists
  - Designed for even the most mission critical enterprise datacenters such as HP-UX 11i, OpenVMS, and NonStop

- Itanium architecture provides scalability headroom as a complement above x86
  - Supporting volume operating systems (Windows, Linux) for a full heterogeneous deployment

"Today, Itanium-based solutions deliver the best performance & capabilities for enterprise & technical computing, and this capability and performance leadership will continue to grow into the future."

Richard Dracott

Director, Intel Enterprise Products Group

Itanium® Architecture: Optimized for performance growth

- **Parallel execution leadership: only Intel has all 3:**
  - Multi cores on same die
  - Multi threads on same core
  - Explicit Parallelism in each core
- **EPIC*: inherent advantages for multi-core, multi-thread**
  - Architecture: Parallelism + many registers to keep data on-chip
  - Core size: Smaller than IA-32, up to 2X more cores per die on Tukwila (than on IA-32)

Performance*

+50%-100% in '07+

+30%-50% in '04

Moore's Law

'04   '07+
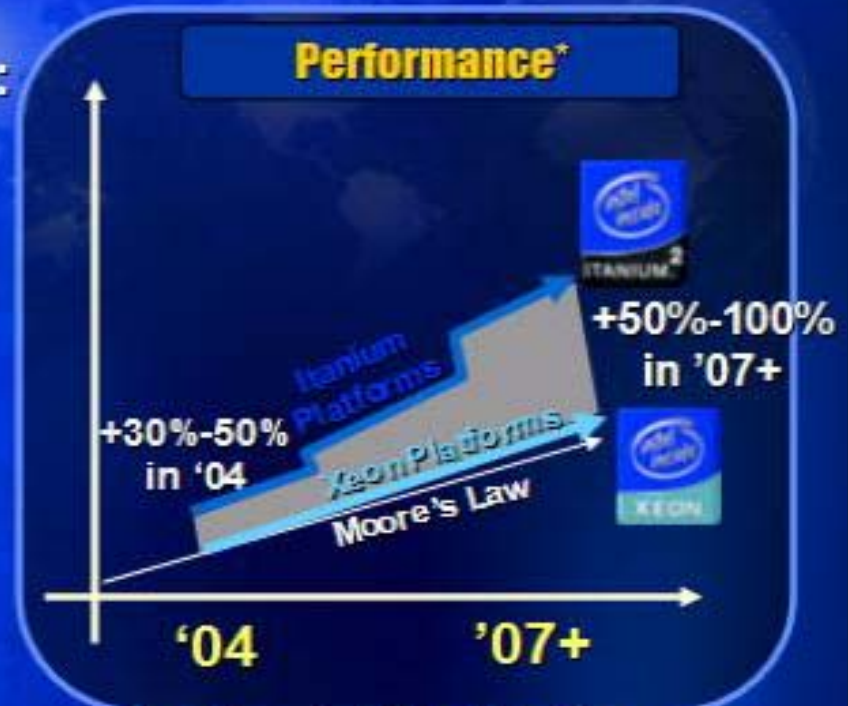
* For Enterprise & Technical Computing Application Segments

Itanium® Processor family delivers >2X Moores' Law performance

* EPIC is Itanium's architecture "Explicitly Parallel Instruction Set Computing"

All products, dates, and figures are preliminary and are subject to change without notice.

intel.

Intel® Itanium® architecture: ultimate technology for technical critical computing
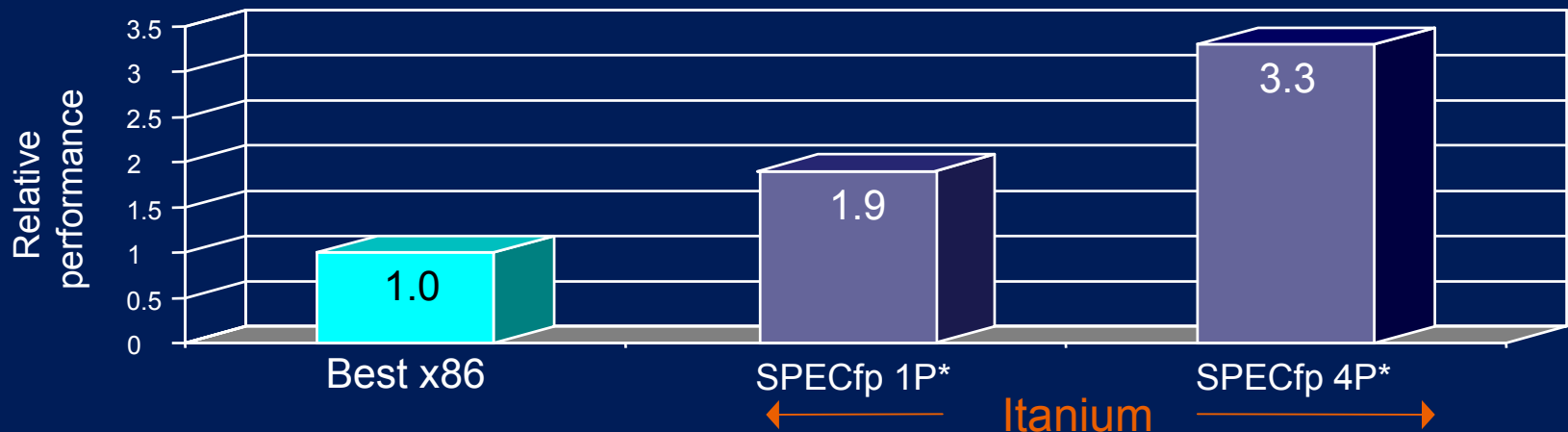
Itanium's unique advantages

- Built-in instruction-level parallelism
- Massive on-chip resources
- Up to 2x instructions/clock cycle
- CPU clock and compiler maturity curve
- Fewer memory loads/stores on complex workloads

Customer benefits

- Higher performance in FP-intensive and complex technical workloads: MCAE, transforms
- 2X performance of x86, at any clock speed, for faster:
  - Image manipulation
  - Voice encoding/recognition
  - Encryption

Relative performance

	Best x86	SPECfp 1P*	SPECfp 4P*
	1.0	1.9	3.3

Itanium

*www.spec.org

Intel® Itanium® architecture: ultimate technology for mission critical computing
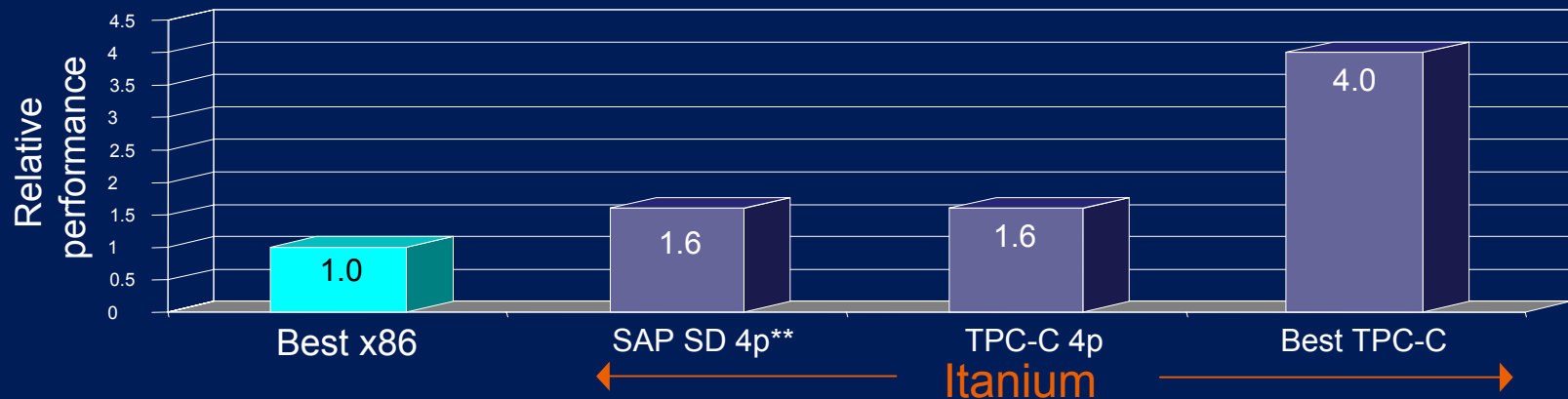
Itanium's unique advantages

- Huge memory address spaces
- 60% shorter memory pipeline
- Latency avoidance
- Instruction predication
- Data and control speculation

Customer benefits

Industry leading performance and scalability for demanding and unpredictable commercial applications:

- OLTP
- database query (TPC-H)
- sorting

Relative performance

Best x86	SAP SD 4p**	TPC-C 4p	Best TPC-C
1.0	1.6	1.6	4.0

Itanium

Addressing your questions

- Does this change HP's industry standard server strategy?

- What does this mean to the positioning of HP Integrity and ProLiant servers?

- Does this change HP's Itanium® processor strategy?

- Will this affect market acceptance of Itanium processors?

HP is leading the future of 64-bit computing
Evolution of Itanium® and x86 accelerates adoption and ISV development

Completeness of 64-bit ecosystem and adoption

Complete 64-bit ecosystem
- 1500+ ISV apps available
- High-performance compilers and tools, full system chipsets, etc
- World leading performance across 32+ benchmarks

NonStop transition to Itanium
- Bulletproof data integrity for instant transaction processing
- Continue lead in mission critical space

Evolution of x86 standards
- Advantages for 32-bit now
- Advances volume adoption of 64-bit capabilities tomorrow

Pervasive 64-bit

'02   '04   '06   '08   Future

■ **Integrity** Itanium   ■ **NonStop** Itanium   ■ **ProLiant** x86

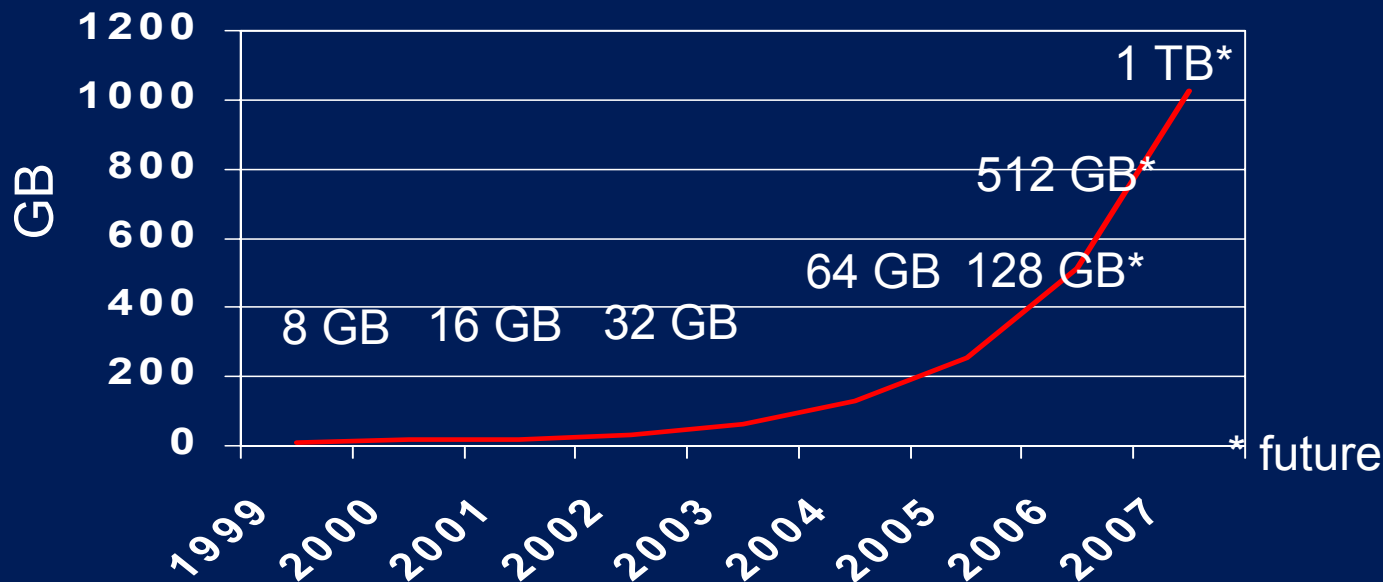# x86 extensions are good for Intel® Itanium® market acceptance over the long term

- 64-bits is becoming more pervasive
  - x86 with 64-bit extension technology will accelerate the adoption and development of 64-bit ecosystems and Itanium processors

- x86 extensions will help the large x86 application base begin to move toward 64-bits
  - This technology fills a gap in the 32-bit market and provides a transition for applications needing expanded memory capabilities
  - The improved 32-bit performance complements Itanium processors' 64-bit performance superiority

64-bit computing becomes pervasive

4P server memory will exceed 1 TB by 2007

Chart: GB (y-axis, 0 to 1200) vs year (x-axis, 1999 to 2007)

- 8 GB
- 16 GB
- 32 GB
- 64 GB
- 128 GB*
- 512 GB*
- 1 TB*

* future

Applications are a driving force to 64-bit

- Real time security
  - Face, voice and fingerprint recognition
  - 64-bits for encryption, virus scanning
- Huge data warehousing (database performance for customer recognition/CRM, transaction times, data mining)
- Rich data types (images and sound) integrated over the Internet
- Complex technical workloads (e.g. graphics, imaging, MCAE)

Intel® is committed to the success of the Itanium® architecture

"Intel is enabling Itanium Platform cost reduction over time and driving to cost parity with Xeon processor based platforms by 2007 through common platform infrastructure"

Michael Fister
Intel
Senior Vice President
Enterprise Platforms Group

intel.

"Intel wants to remove price as a barrier to the acceptance of Itanium servers, a goal that could allow the processor to become the company's primary (high performance) server chip in the second half of the decade."

CNET News.com
Intel to chip away at Itanium prices
By Michael Kanellos
Jan. 14, 2004

Why the Itanium®-based systems market has grown 500%* over the past year

- **Itanium architecture has a robust and growing ecosystem**
  - High performance compilers and tools, full system chipsets, storage support, etc.
  - 1,500+ ISV applications available now on HP-UX, Windows and Linux
  - Itanium has been adopted by 8 out of 9 RISC vendors and over 40 OEMs
- **Full, leadership end-to-end 64-bit architecture**
  - Full HP server line: from 1 to 128-way; field-proven, commercial-grade hardware and OS.
- **Itanium leads in 32+ benchmarks**
  - Technical and commercial; across UNIX, Windows, and Linux.

*IDC

HP Integrity takes the hill with unprecedented and sustained performance leadership
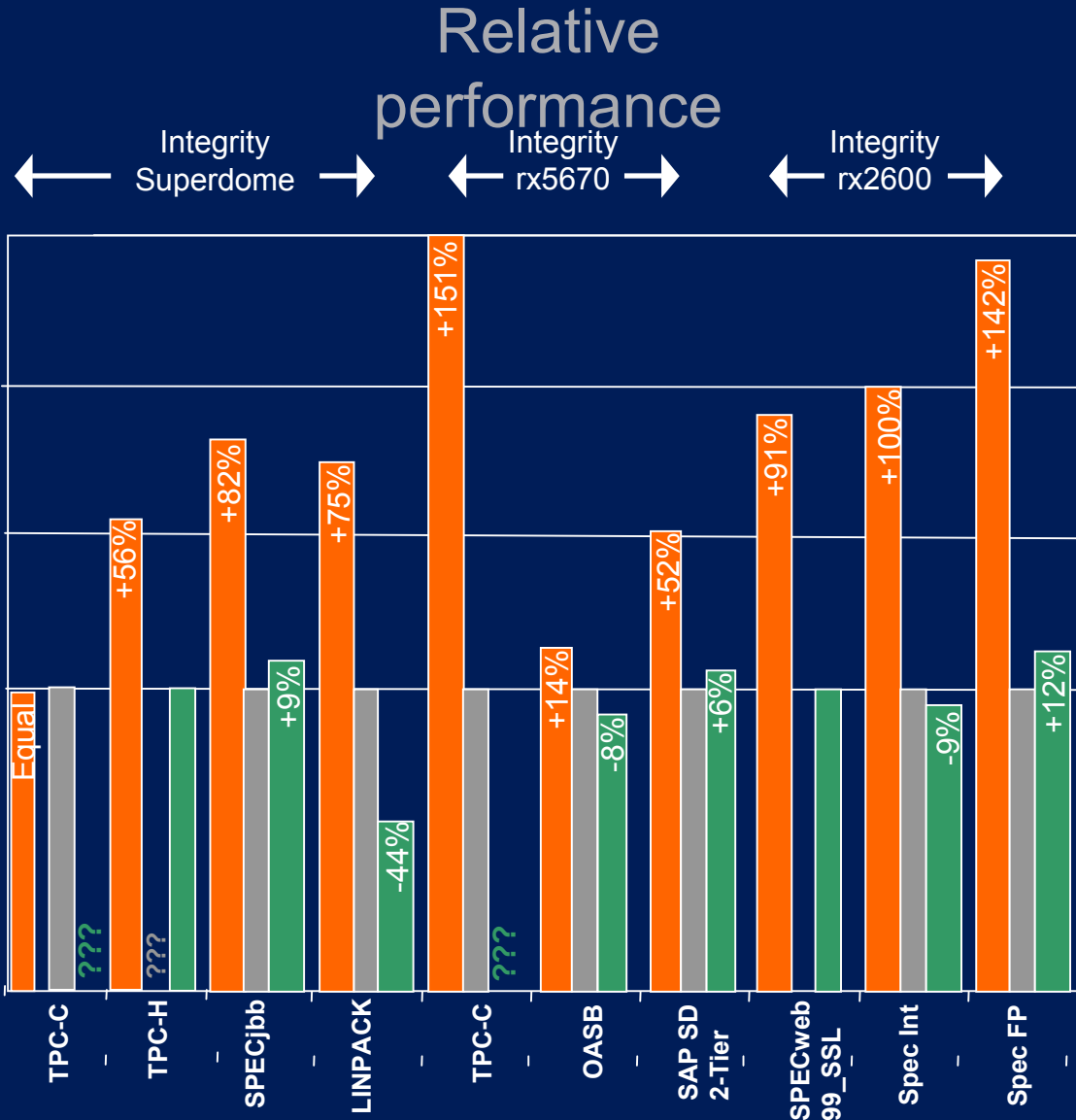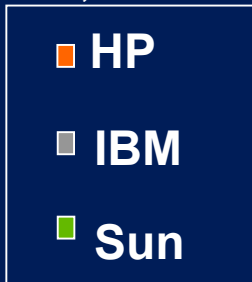
Across diverse workloads
(TPC, SAP, Java, Oracle apps, SPEC CPU, and SPECweb 99_SSL)

Across multiple servers
(Superdome, rx5670, and rx2600)

Across multiple operating systems
(HP-UX, Linux, Windows)

- **HP**
- **IBM**
- **Sun**

Relative performance

Integrity Superdome →

← Integrity rx5670 →

← Integrity rx2600 →

Equal

TPC-C: +56%, ???
TPC-H: ???
SPECjbb: +82%, +9%
LINPACK: +75%, -44%
TPC-C: +151%, ???
OASB: +14%, -8%
SAP SD 2-Tier: +52%, +6%
SPECweb 99_SSL: +91%
Spec Int: +100%, -9%
Spec FP: +142%, +12%

System Model	Operating System	Database	tpmC	$/tpmC	Available
HP Integrity Superdome	HP-UX 11i v2	Oracle 10g	1,005,436	$8.40	12/31/03
IBM p690 turbo	AIX 5L v5.2	DB2 UDB 8.1	1,025,486	$5.43	08/16/04
HP Integrity rx5670	RH EL AS3	Oracle 10g	136,111	$4.09	09/05/03

System Model	Operating System	Database	QphH	$/QphH	Available
HP Integrity Superdome	HP-UX 11i v2	Oracle 10g	45,247	$109	03/25/04
Sun Fire 15K	Solaris 9	Oracle 9i R2	28,948	$184	04/30/03

Growing support for operating systems on HP Integrity servers
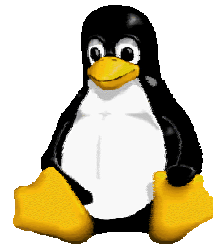
- Continued momentum with ISVs & customer adoption
  - 1,000+ applications now available
    - including Oracle, SAP, BEA
  - First to break 1 million tpmC*

- New low-end price point under $3,000 US with the rx1600
- #1 clustered TPC-C result: 1.18 million tpmC*
- Indemnifying customers a big hit
- Growing ISV availability: Sybase, Oracle, BEA, SAP & others

- OpenVMS v8.1 for HP Integrity
  - First native version on HP Integrity
  - Accelerating ISV commitment
    - 280 ISVs
    - 600 applications

* Source: www.tpc.org

System Model	Operating System	Database	tpmC	$/tpmC	Available
HP Integrity Superdome	HP-UX 11i v2	Oracle 10g EE	1,005,436	$8.40	12/31/03
HP Integrity rx5670 64p	RH EL AS3	Oracle 10g EE	1,184,193	$5.52	04/30/04

Growing support for Windows on HP Integrity servers

Microsoft **Windows Server** 2003

Broadening adoption of 64-bit Windows on HP Integrity servers

- Most scalable server platform drives Windows further into the enterprise data center
- Key opportunities: OLTP, consolidation, business intelligence, and superior database engine for 32-bit applications
- #1 Windows TPC-C result on HP Integrity Superdome*
- Well over 1/3 of Integrity Superdome servers ship with Windows

"Microsoft Windows Server 2003 and HP Integrity server solutions have helped establish the Itanium architecture as the 64-bit platform for enterprise customers who require the highest levels of scalability. Customers trust their data centers to Windows on HP Integrity servers. In collaboration with HP, Microsoft is committed to delivering continued improvement in the scalability and performance customers need."

Dennis Oldroyd
Director,Windows
Server Business Group
Microsoft Corporation

* See www.tpc.org

Performance roadmap
for Xeon and Itanium® processors

Lowering the Itanium® platform cost

Intel® Itanium® architecture: Sustainable advantages over the long run

Technology			
Optimized for parallelism	**Massive on-chip resources**	**Efficient utilization of memory hierarchy**	**Leading RAS built-in**
Application Targets			

Floating point intensive applications:
 	
HPTC, SAS, MCAE
	Fastest data transforms:
	
	MCAE, image manipulation, voice encoding/ recognition, encryption
		Commercial Applications:
		   OLTP, database query (TPC-H), sorting
		
		Technical Applications:
		   FEA, MCAE, voice recognition
			Scalable mission-critical applications:
			
			OLTP, ERP, data warehouse, data mining

Summary

- HP Integrity + ProLiant + NonStop servers = advantage for HP customers

- HP is focused on industry standard servers
  - HP direction is to incorporate Intel® Xeon and AMD Opteron processors with 64-bit extension technology across ProLiant servers
  - Integrity servers are HP's strategic platforms for 64-bit enterprise computing
  - HP NonStop servers will move to Itanium® processors

- x86 extensions will further accelerate the market for Itanium processors

HP Integrity Servers for Windows Server 2003 Environments

propelling Windows further into the enterprise

Jan 2004

Limits of legacy processor architectures

- Processor architecture advances of RISC no longer growing at the rate seen in the 1980s–1990s

- Complexity of certain workloads exceeding the capabilities of IA-32

- Demand for greater application performance, due to:
  - higher-bandwidth tasks
  - secure processing
  - increased users

- Ongoing needs of business:
  - greater flexibility
  - better price/performance
  - industry standards

Advantages of standards-based Itanium architecture for Windows customers

- RISC customers benefit from:
  - OS choice–e.g., Windows for improved TCO and greater business value
  - lower hardware costs for enterprise IT
  - assurance of leading performance and scalability over the long-term

- 32-bit Windows customers benefit from:
  - an enterprise-class architecture that extends Windows further into the data center:
  - the ability to expand to increasingly complex workloads
    - massive databases
    - decision support systems and data warehousing
    - line-of-business applications, such as CRM, ERP, SCM
  - vertical scalability to unprecedented levels: 64 processors and 512 GB memory

HP Integrity servers: broadest line of Itanium®-based systems supporting Windows Server 2003

HP Integrity Superdome

Up to 64-way scalability and hard partitioning capability for leading consolidation

HP Integrity rx8620

16-way scalability and hard partitioning capability for consolidation

HP Integrity rx7620

8-way flexibility with high performance, density, and partitioning capabilities

HP Integrity rx4640 and rx5670

4-way high-performance servers in ultra-dense and highly scalable models

HP Integrity rx2600 and rx1600

2-way ultra-dense, power-packed server redefines entry-level computing

Windows Server 2003 Editions

- Target: Datacenters, large RDBMS, LOB apps, DW
- 32-bit, support for up to 32-way SMP & 64 GB RAM, HT
- 64-bit, support for up to 64-way SMP & 512 GB RAM, IA-32 EL
- 8-node clustering, NUMA, WSRM (resource manager)

Microsoft Windows Server 2003 Datacenter Edition

- Target: Medium to large enterprises, LOB apps, DB
- 32-bit, support for up to 8-way SMP & 32 GB RAM, HT
- 64-bit, support for up to 8-way SMP & 64 GB RAM, IA-32 EL
- 8-node clustering, NUMA, WSRM (resource manager)

Microsoft Windows Server 2003 Enterprise Edition

- Target: Small or departmental environments, enabling basic file and print and collaboration
- 32-bit, support for up to 4-way SMP & 4 GB RAM, HT
- 64-bit, support for up to 4-way SMP & 32GB RAM, IA-32 EL*

Microsoft Windows Server 2003 Standard Edition

- Target: Built for Web serving and hosting, platform for rapidly developing and deploying Web services and apps
- Support for up to 2-way SMP & 2 GB RAM
- Hyper-Threading

Microsoft Windows Server 2003 Web Edition

Microsoft Small Business Server 2003

Windows Server 2003 Family

* Standard Edition for Itanium-based systems available at SP1

Windows Server 2003 system specifications

configuration parameter	Web edition (32-bit)	standard edition (32-bit)	enterprise edition (32/64-bit)	datacenter edition (32/64-bit)
maximum RAM	2 GB	4 GB	32-bit: 32 GB 64-bit: 64 GB	32-bit: 64 GB 64-bit: 128 GB
multiprocessor support	Up to 2 processors	Up to 4 processors	Up to 8 processors	(Min. 8 processors) 32-bit: Up to 32 processors 64-bit: Up to 64 processors
disk space required	1.5 GB	1.5 GB	32-bit: 1.5 GB 64-bit: 2 GB	32-bit: 1.5 GB 64-bit: 2 GB
cluster capability	n/a	n/a	8 node	8 node

Windows Server 2003 for 64-bit Itanium 2 systems

Benefits	Features
Additional scalability and reliability for memory-intensive applications	• Breaks 4 GB/64 GB memory limits • Enables up to 16 terabytes of flat virtual memory • Greater physical memory capabilities • Hardware error detection and prediction
Extends the investments organizations have already made in Windows	• Lets IT pros and developers leverage their existing Windows skills • Complements Windows Servers on the IA-32 platform • Interoperable witah 32-bit Windows • Easy to migrate 32-bit Windows-based applications to 64-bit Windows
The platform for 64-bit Itanium 2-based server applications	• Native support for Itanium-based servers • ptimized for the Itanium 2 processor • Broad 64-bit application support • Familiar windows programming model
The platform for HP Integrity server family	• optimized for the HP zX1 and sx1000 Chipsets • supports 64p and 512GB memory on the HP Integrity Superdome server

HP Delivers more with Integrity Servers for the Windows enterprise

more Agility

World-leading performance and vertical scalability

leading 64-bit Windows ISV databases and complex enterprise applications available today

breakthrough flexibility
  run Windows Server 2003 on industry leading HP ProLiant and HP Integrity servers
  multi-OS capability

more Accountability

Best-in-class industry standard server solution deployment

HP's expansive, robust solutions ecosystem for 32-bit Windows now extends to 64-bit Windows

HP's leadership services and support

better Return on IT

Automated, intelligent management
  for Windows and multi-OS environments
  across HP Integrity and ProLiant Servers

Lasting value and investment protection
  long term evolution path
  ability to run 64-bit Windows Server 2003 as well as HP-UX, Linux and in the future, OpenVMS on HP Integrity

Demand More!

Agility

RoIT

Accountability

Growing a robust Windows/Integrity ecosystem through industry partnerships

- Based on joint engineering and collaboration, HP delivers best-in-class 64-bit Integrity server solutions with major Windows ISVs
  - Microsoft
  - Oracle
  - SAP
  - SAS

- certification of 64-bit SQL Server with 32-bit applications from
  - ARGO
  - PeopleSoft
  - Ross
  - Siebel Systems
  - SSA iBaan ERP 5.0c

expanding HP's complete and robust ecosystem from 32-bit Windows to 64-bit Windows

Database solutions

IBM — DB2 UDB V8.1

Microsoft SQLServer 2000 Enterprise Edition (64-bit)

ORACLE — Oracle 9i Database

Complex LOB solutions

ARGO Data Resource Corporation

Hyperion

PeopleSoft — PeopleTools/Apps

ROSS — Gembase

sas — SAS v9

SSA global™ forward faster — ERP 5.0c

SAP — R/3 Enterprise, mySAP SCM, APO

SIEBEL

IT Infrastructure solutions

bmcsoftware — Smart DBA

bea® WebLogic JRockit 8.1 SDK

ca Computer Associates — eTrust 7

LEGATO — NetWorker 7

McAfee SECURITY — Virus Scan Enterprise

symantec. — AntiVirus Corp Edition

VERITAS™ — NetBackup 4.5
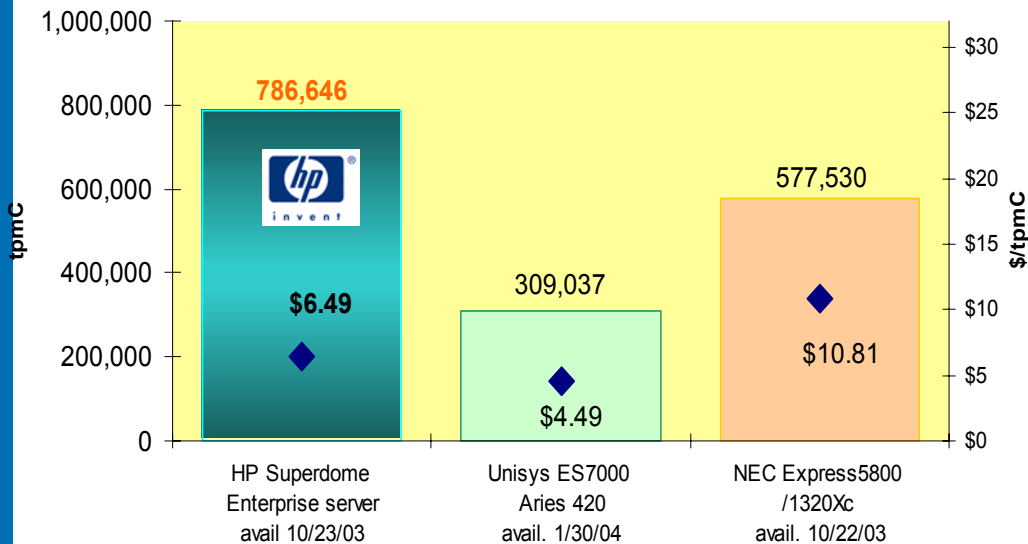
Server 2003 Performance on HP Integrity Superdome!!

TPC-C : Top Windows Performance for HP Superdome with Windows Server 2003

Availability date for the HP Superdome Enterprise server configured is October 23, 2003

Data as of January 23, 2004. See complete results at www.tpc.org.

- HP Integrity Superdome with 64 Itanium 2 6M processors running 64-bit SQL Server 2000 and Windows Server 2003 delivers record breaking database performance
  - #1 published Windows Server 2003 performance at 786,646 tpmC
    - 155 % better than Unisys (32-way)
    - 36 % better than NEC (32-way)
  - Exceptional enterprise price performance of $ 6.49 /tpmC beats Unisys and NEC systems greater than 16-way!

Microsoft

"Microsoft and HP have proven that customers can reduce total cost of ownership by scaling up or consolidating multiple databases using SQL Server 2000, running on the 64 processor HP Integrity Superdome Server. The record-breaking TPC-C results demonstrates the high performance and low cost an HP and Microsoft 64-bit solution can deliver to customers who are seeking alternatives to expensive proprietary platforms. This joint Microsoft and HP achievement is a historic milestone for SQL Server 2000, Windows Server 2003 and Integrity Servers as we continue to deliver unprecedented price/performance for our customers."

Microsoft
SQL Server 2000
Enterprise Edition (64-bit)

Gordon Mangione

Corporate Vice President for SQL Server

Microsoft

Top performance with SAP APO demand planning

SAP APO planned characteristic combinations
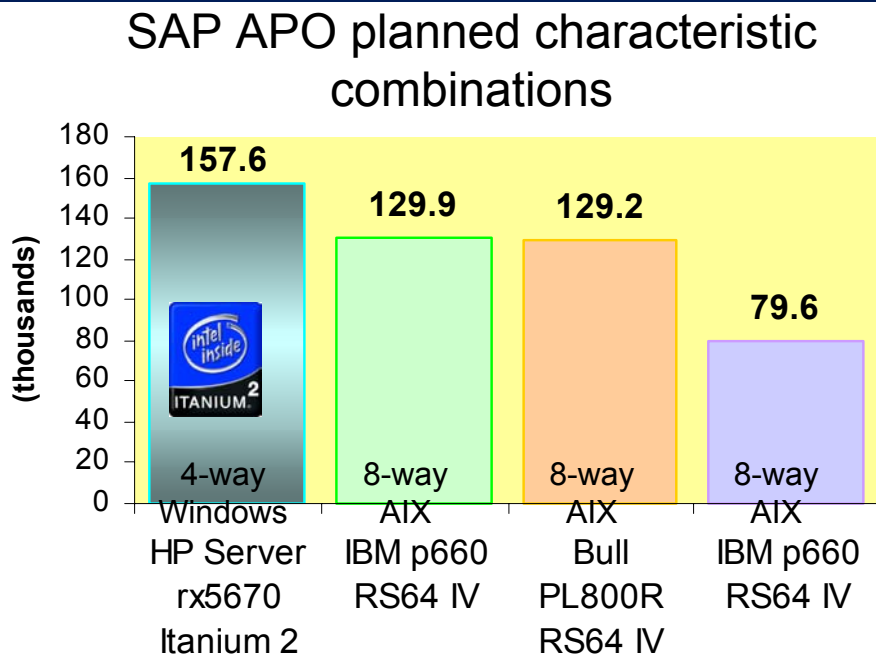
- HP Server rx5670 delivers best benchmark performance under 16 CPUs
  - 21% better than best 8-way
  - SQL Server 2000 on Itanium-based servers from HP beats DB2 with half the processors
  - HP Server rx5670—157,555 aggregated planned characteristic combinations per hour with four Intel Itanium 2 CPUs at 1 GHz and 32 GB of RAM, Microsoft Windows 2000 Advanced Server LE v1.2, Microsoft SQL Server 64-bit database

Data as of Sept. 30, 2002.
www.sap.com/benchmark/APO_2_tier.htm

Standards-based HP Integrity and ProLiant servers combine to deliver powerful Windows CRM performance

SIEBEL.

- 12,000 users achieved with Siebel 7.5.2 PSPP Benchmark

- HP FIRST. Benchmark results harness the power of HP Integrity Servers and HP ProLiant servers running Siebel eBusiness Applications on Microsoft Windows 2000 AS with SQL Server 2000 (64 bit)

- Configuration
  - 32-bit Siebel 7.5.211 application and web servers running on HP ProLiant
  - 64-bit Microsoft SQL Server Database on 4-way HP Integrity rx5670
    - Intel® Itanium® 2, 1.5 GHz Processors w/ 48 GB memory
    - Less than 47% processor utilization

- For full technical details and disclosure:
http://www.siebel.com/products/performance_benchmark/index.shtm

Complete choice to meet diverse needs across the data center

Integrity & NonStop servers

Mix of ProLiant, Integrity & NonStop

ProLiant & Integrity systems

Integrity & NonStop

Integrity

ProLiant & Integrity

ProLiant

HPC — Large SMP, large memory

BI — Biz intelligence Very large data sets

BI — Biz intelligence/ SCM planning

OLTP large — OLTP large size DB High transaction volumes

OLTP med — OLTP mid size

Mail — Messaging

HPC — Parallel computing, clustering

ERP medium — Back-end for CRM, SCM, ERP

ERP large — Back-end for CRM, SCM, ERP, large data sets

Infra-structure — Directory, DNS, firewall, security

App tier — ERP, biz logic, app server

Web — Services, caching, proxy

Work group — File, print

Front-end

Application & data-tier

Large scale data tier

1 - 4 processors

4 - 8 processors

8 - 64+ processors

The world's leading standards-based portfolio optimized for Windows in any environment

BL = Blades
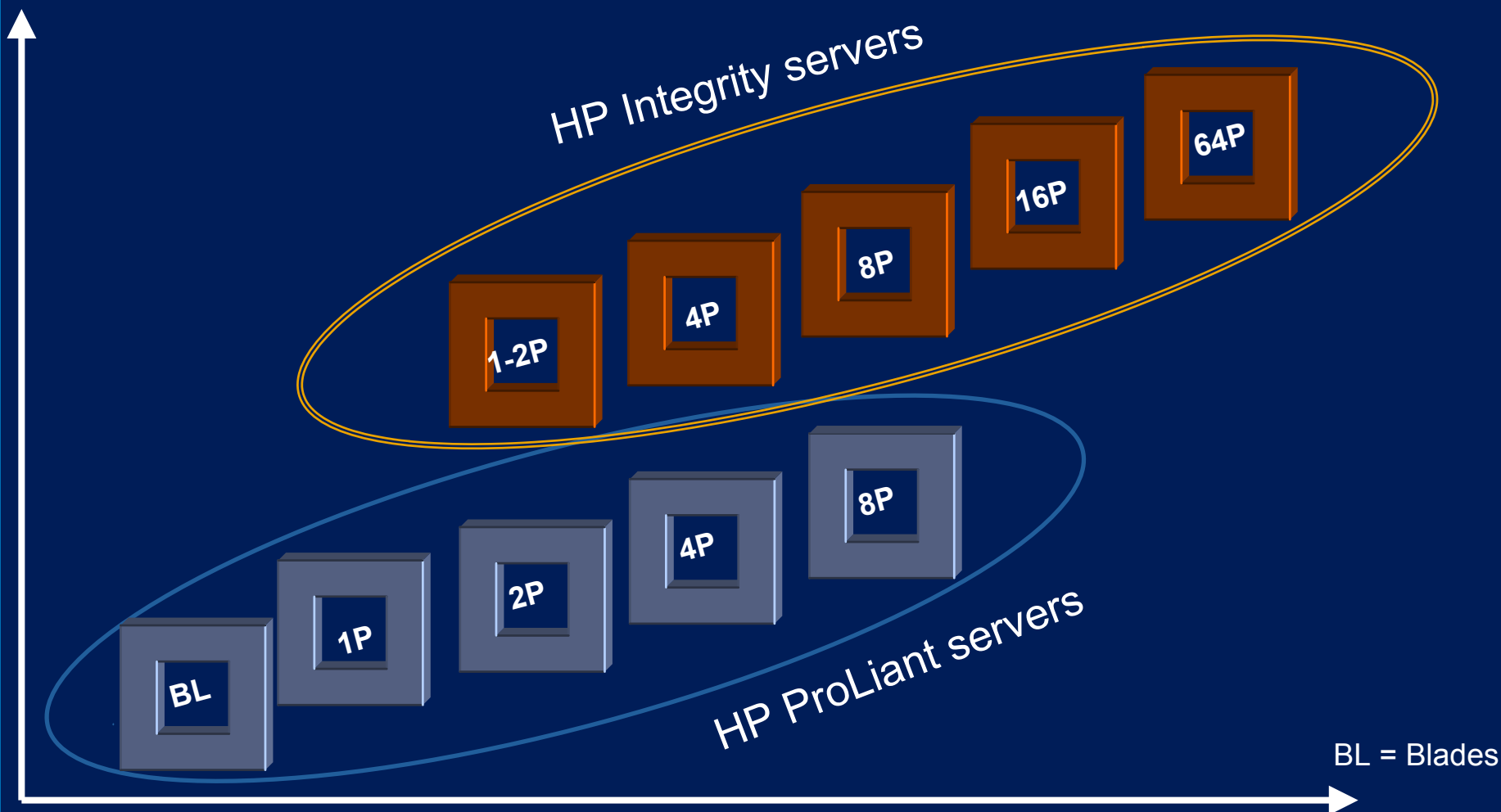
Solving scale-up db and complex LOB problems with Windows Server 2003 and HP Integrity Servers

Database

- Relational database management system (RDBMS)
- Online transaction processing (OLTP)
- Decision support (data warehouse, data mart)
- Data mining (business intelligence)
- Database consolidation

Business applications

- Customer relationship management (CRM)
- Enterprise resource planning (ERP)
- Supply chain management (SCM)
- E-commerce applications
- Product development and design automation
- Industry-specific applications
  - financial services
  - oil/gas
  - manufacturing
  - science/academia
- Custom line-of-business (LOB) applications

Integrity
Superdome
(up to 64proc)

Transition from 32-bit to 64-bit SQL Server 2000 Enterprise Edition seamlessly

- Plug in the disks and go!
  - issue command call "sp_attach_db"
  - on-disk structure is 100% the same
- If keeping IA-32 system
  - use backup from IA-32
  - restore onto 64-bit system
- Networking layer of 64-bit version of SQL Server 2000 Enterprise Edition accepts input from 32-bit clients just as with 64-bit clients

Run your 32-bit application on your 32-bit server with a 64-bit database server and experience the performance benefits!

Windows Server 2003 high availability for Integrity server solutions

- Ensure data integrity

- Maximize application availability

- Minimize planned maintenance time

- Solutions:
  - Microsoft Cluster Services for Windows
  - comprehensive portfolio of Windows Clusters service configurations engineered by HP for no single point of failure
  - HP Cluster Verification Tool for Windows Cluster Services
  - Insight Manager 7 - Proactive Fault Management
  - Oracle9*i* RAC for Windows
  - disaster-recovery products to protect mission-critical data*

  * estimated available 2H03

Full Suite of HP Storage for Integrity servers in Windows environments

•2GB FC HBA (A7298A)
  •Supported with
    •XP 128/1024/48/512
    •VA7410/7110
  •Limited cluster certifications

•2GB FC HBA (LP9802)
  •Supported with
    •EVA 3000
    •EVA 5000
    •MSA1000 v2
    •XP 128/1024/48/512
    •VA7410/7110
  •Select cluster certifications

•SmartArray 5302/5304

•StorageWorks 43xx

•SecurePath 64-bit

•SmartArray 6402

•SmartArray 6404

•StorageWorks 44xx

HP Services throughout the solution lifecycle

Applying the full scope of service capabilities

Plan and Design	Integrate	Install	Manage
Business/IT assessments Detailed design	Application porting, migration, and implementation IT consolidation Factory integration Testing and piloting design	Solution deployment Education Technical services	Ongoing reactive and proactive support Mission-critical support Outsourced solutions Technical services

HP Services leadership

- Global reach via presence in more than 160 countries

- More than 80 customer education centers worldwide

- 28,000 Microsoft® specialists and 5,000 certified engineers

#1 mission-critical infrastructure services

#1 services for open HP-UX, Windows, and Linux IT environments

#1 enterprise-ready Microsoft integration and support services

#1 ranked outsourcing company

The business value of Windows and HP Integrity server solutions to customers

RAYMOND JAMES *You first.* Financial*; North America*	"Update across fact table (2.8 million rows) took 2 minutes; this had taken 14 hours on an 8-way Xeon MP." **Solution:** Itanium® 2-based HP Superdome server running 64-bit versions of Microsoft SQL Server 2000 and Windows Server 2003, Datacenter Edition	Once deployed, they will be able to serve many more clients, more responsively.
The Presidential Administration of Chuvashia Government*; Russia*	The process of creating new material for the portal, and updating existing content, has sped up by a factor of 10. **Solution:** HP Integrity Server rx2600 running MS Windows Server 2003 and SQL Server 2000 (64-bit)	Enables storing and processing of huge volumes of information content (e.g., a million of Chuvashia encyclopedia volumes)
CompUSA Retail North America	OLAP takes 1/60th the time (33 min. vs. 33hrs.) of the previous solution. Solution: HP Integrity Server rx8620, MS Windows Server 2003 and SQL Server 2000 (64-bit)	Delivers superb scalability for growth and ability to support different types of analysis
CBS Television Network	*"In recent testing, the HP Integrity rx5670 server provided up to 80 percent improvement in processing times on our database. We saw that the combination of HP Integrity servers, Windows Server 2003 and SQL Server 2000 for our database provided CBS with the performance we demand for one of our most critical business applications. In addition, the Integrity server provides outstanding scalability and flexibility for future projects."* **Amy Berkowitz, CIO** **CBS Broadcasting Inc.**	

Raymond James Financial scales up with standards-based HP Integrity, Microsoft Windows, and SQL Server

Challenge

- Single source of data for financial advisors
- Mid-range data warehouse for decision support
- Industry-standard infrastructure with performance of proprietary system

Solution

- HP Integrity Superdome server
- Microsoft Windows Server 2003, Datacenter Edition
- Microsoft SQL Server, Enterprise Edition, 64-bit

Results

- >5 times performance increase over previous 32-bit systems
- Update to fact table reduced from 14 hours on 32-bit to 2 minutes!
- Financial advisors will have one place for information and data analysis

RAYMOND JAMES

Raymond James Financial

Founded in 1962, Raymond James Financial is now one of the largest financial services firms in the United States, with more than 2,100 locations worldwide. Raymond James provides individual investors, corporations and municipalities with investment, financial planning, investment banking, asset management, banking and trust services throughout the United States, Canada and internationally. Raymond James has over five thousand financial advisors, both employees and brokers that work directly with the investor clients.

"Our data warehouse and decision support system will ultimately be made available to more than 5,000 financial advisors nationwide as well as thousands of employees. We needed an architecture with exceptional performance and scalability that would help us drive down IT costs. We are fortunate enough to have access to the soon-to-be released Itanium® 2-based HP Superdome server running 64-bit versions of Microsoft SQL Server 2000 and Windows Server 2003, Datacenter Edition. The combination offers superior performance and unmatched scalability, giving us the ability to handle a massive database and data warehouse solution. At the same time, because we are dealing with technology based on industry standards, we can achieve exceptional performance while lowering our total cost of ownership."

Tim Eitel

CIO

Raymond James Financial

HP Integrity server meets need for superior response time and better scalability

Value: Superior performance and scalability

Company:	The Presidential Administration of Chuvashia
Industry:	Local government portals in Russia
Value:	Performance and scalability

Business need:	• A pilot site for e-government in Russia to build a "single point of contact" portal with extensive growth requirements
	• Response-time delays creating problems for internal users and the public
Solution:	• HP Integrity rx2600 server running Microsoft Windows Server 2003 and SQL Server 2000 (64-bit)
Results:	• Increased portal speed, improving response time for users by a factor of four and enabling multimedia content for the first time
How:	• Reduced total cost of ownership by 80%
	• Transition the database from 32-bit to 64-bit architecture on Itanium architecture
	• Increased memory, performance of the processors

HP Integrity Servers Improve Data Warehouse Performance in CompUSA tests

Value: OLAP processing takes 1/60th of the time using HP Integrity server

Organization:	CompUSA
Industry:	Retail
Value:	**High-performance decision support**

Business need:	• OLAP processing using 32-bit solution took up to 14 hours, with severe impact on day to day business • Ensure scalability to support business growth
Solution:	• Test 16 processor HP Integrity rx8620 server running Microsoft Windows Server 2003 and SQL Server 2000-based data warehouse
Results:	• OLAP processing takes 1/60th of the time (33 minutes) on 16-processor HP Integrity rx8620
How:	• Superb scalability for growth and ability to support different types of analysis • Ability to pursue multiple OS strategy in the future

CompUSA
retail

"CompUSA seeks to continuously improve its data warehouse performance. Our goal is to migrate to a 64-bit architecture to improve processing power while keeping IT costs in check. We used HP Integrity servers to test a partitioned version of Windows 2003 E-space architecture in which a Microsoft SQL-based data warehouse is populated, segmented, and calculated. Benchmark results indicated that HP Integrity servers will provide an exceptionally scalable solution that will improve our data warehouse performance. In fact, processes that took 14 hours on our existing architecture take only 33 minutes on the HP Integrity Superdome server. The HP Global Solution Center provided a great resource to benchmark this solution in a secure environment, and the access to HP experts was integral for our success in testing this new architecture.

Doug Gray
Director of SAP and Data Warehouse Operations
CompUSA Inc.

Customers moving to Windows and Integrity server Solutions

- Data warehousing: SQL Server - Raymond James
  - Testing and planning to deploy HP Integrity Superdome for decision support for financial advisors
  - Need highest levels of scalability plus price/performance and TCO of Windows solutions

- Business intelligence: SAS – Wells Fargo
  - Faster data mining for customer profiling and targeted marketing for financial advisor

- Enterprise resource planning with SAP R/3 – Multiyork
  - Linked complex front-end retail process to its manufacturing, finance, delivery and human resource functions on HP Integrity rx5670 with growth and scalability for future

- High-performance computing: SQL Server – Johns Hopkins University
  - Required larger SQL Server database access for faster processing of large amounts of data to catalogue the observable universe

- Database performance with mySAP.com: SQL Server – VTG-Lehnkering
  - Seamlessly moved to a high-performance 64-bit platform capable of handling its existing logistics applications while accommodating large-scale and rapid growth and future-proof technology.

- e-government portal: SQL Server - The Presidential Administration of Chuvashia
  - Pilot site for e-government in Russia to build a "single point of contact" e-government portal to address response-time delays creating problems for internal users and the public. Response times have improved by 4X, and portal speeds are increased to accommodate multi-media.

Wells Fargo & Company

Wells Fargo & Company is a diversified financial services company with $312 billion in assets. With over 1.5 million businesses in the United States, Canada and Puerto Rico receiving capital and financial services from Wells Fargo, it is essential that its IT infrastructure provides its customers with the maximum in flexibility, availability and performance.

"We have been using the Itanium®-based HP DL590/64 server for over a year now, and we were impressed with its performance, especially when we were processing very large volumes of data. We are looking forward to using the next-generation Itanium® 2-based HP systems and seeing how the new SAS configuration will increase performance."

Savvas Papaiacovou
Vice President and Manager
Customer-based MIS Distribution Strategies
MAA
Wells Fargo & Company

Multiyork
Retailer and Manufacturer of High Quality Furniture

Challenge
- Needs integrated solution to manage its business
- Increase efficiency in the order management cycle

Solution
- HP Integrity rx5670 server with four processors
- Microsoft Windows Server 2003 Enterprise Edition
- Microsoft SQL Server 2000 Enterprise Edition 64-bit
- SAP (initially 32-bit with plans to migrate to 64-bit)

Benefits
- Leading edge ERP platform at the best price/performance ratio
- Improved efficiency in the order-to-production supply chain
- Huge improvements in processing power

MULTIYORK

Multiyork Furniture

Multiyork, the UK-based manufacturer and retailer of tailor-made furniture, will power its SAP solutions on HP Itanium® 2-based servers running Windows. Multiyork plans to integrate all operations to remain competitive and to improve its growing business.

"HP, Microsoft, SAP and, Itanium® 2-based server processing power is a winning combination the latest leading edge ERP platform at the best price/performance ratio currently available. This is exactly what we required to integrate and improve our business practices."

Peter Mallinson
Chief executive
Multiyork

The Johns Hopkins University

The Johns Hopkins University is a world leader in teaching, patient care and discovery. The Johns Hopkins Digital Sky Survey project needs the highest caliber IT memory system due to the large amount of data that is stored and the computations that are completed as part of the project.

"Cataloguing a portion of the observable universe requires vast amounts of memory and exceptional processing power. The Johns Hopkins SDSS project is handling over 70 million galaxies in the database, stored in Microsoft SQL Server 2000. With each successive generation of Itanium®-based HP servers running Microsoft SQL Server 2000, we have reduced the time it takes to analyze the distribution of galaxies and other objects by—in some cases—months. For example, when we start working with about 32 million objects, a server with 1 GB will take half a year to complete the calculations, while an Itanium®-based platform with 28 GB of memory will do the job in 10 days. The database performance has been nothing short of spectacular. We ran queries at speeds of 700 megabytes/sec. We have also used the Itanium® 2-based machines for cosmological computations, measuring the curvature of the universe. We expect another quantum leap in performance with the newest generation of HP servers, based on Intel® Itanium® 2 'Madison' processors and running the 64-bit version of Microsoft SQL Server 2000. Itanium® 2-based HP servers running Microsoft SQL Server 2000 are a superb platform for our mega-calculations."

JOHNS HOPKINS
U N I V E R S I T Y

Alex Szalay
Alumni Centennial Professor
Johns Hopkins University

VTG-LEHNKERING AG

VTG-Lehnkering, a subsidiary of Hapag-Lloyd AG, is a leading specialized logistics company based in Hamburg, Germany. The company wanted a planned strategic road-map for its IT strategy, backed up by expandable and future-proof technology. It moved seamlessly to a high-performance 64-bit platform capable of handling its existing logistics applications while accommodating large-scale and rapid growth. VTG-Lehnkering chose a system using Microsoft® Windows® SQL 2003 Enterprise Edition (64-bit) running on an HP Itanium® 2-based server:

"By implementing Microsoft SQL Server 2000 (64-bit) on an Itanium® 2-based HP server, we were able to get the memory addressability we needed to run our mySAP.com applications more efficiently. We are very pleased with the performance and reliability that HP, Itanium® 2 and Microsoft have delivered to our mission critical applications."

Roman Mielinski
IT Director
VTG-Lehnkering

Choice and flexibility: Customers are moving to HP Integrity servers to support concurrent multiple operating systems

Delaware North Companies, global leader in hospitality, food service, retail and gaming.

What they implemented:

- HP Superdome servers running HP-UX today, Itanium 2-based systems in the future.
- Centralized Financial Processes

Why they chose HP Integrity servers

- Concurrent support for HP-UX and Windows
- Enhanced manageability and scalability
- Dynamic IT environment
- Reduced risk and complexity
- Better return on our information technology investment

David E. Meacham
Director of IT
Delaware North Companies

123 Multimedia

123Multimedia creates and distributes content such as telephone services, television content, chat forums and games via multiple channels, from mobile phones to digital TV. As well as a highly robust and reliable infrastructure these services require a vast amount of data processing and the company was finding its previous computing power was limiting its data analysis. 123Multimedia has been testing a combination of Microsoft® Windows® SQL Server 2003 Enterprise Edition running SQL Server™ 2000 (64-bit) and Microsoft Analysis Services with a 4-way Intel® Itanium® 2 processor based HP RX5670 server to improve data processing and ensure it continues to meet consumer demands as Internet and mobile usage continues to grow.

"The increased performance of using the HP server with Intel Itanium 2 processor and Microsoft SQL Server 64-bit edition has been like moving from a 1 litre to a 3 litre car but at no extra cost! We've seen a dramatic increase in the transactions we can handle and are now processing a million pieces of information in the same time it used to take us to process 400,000 pieces. This allows for much richer and more timely information on which to base our business decisions.

"In addition to the performance benefits of moving to 64-bit we can also save money. This is the least costly migration we have ever done and our maintenance and training costs will be reduced in the longer term because we've chosen an industry standard platform. We're very happy with the testing we've done and look forward to switching over to the new system completely."

Noel Joinson

123Multimedia invests for the future with HP Integrity rx5670 and SQL Server (64-bit)

Challenge

- Creates and distributes content for premium services such as chat, telephone services and games
- Innovation and speed to market are crucial in this high-tech industry
- Needs scalability and higher performance to deliver additional services and analyze service usage data

Solution

- HP Integrity rx5670 server with 2 Itanium processors
- Microsoft Windows Server 2003 Enterprise Edition
- Microsoft SQL Server 2000 (64-bit)

Results

- Handles 5 times more traffic than 32-bit platform (2,000tps)
- 16 times performance increase for their analytical application
  - 5 hour OLAP reports now done in almost REAL-TIME
- Lower costs through application consolidation and reduced training needs
- Solid product roadmap secures investment for the future

Automated Intelligent Management
solutions for Integrity servers

Enterprise management
operations/service/business

Data center virtualization

Workload management

Centralized management
fault, inventory

Embedded remote management

Deployment

HP OpenView

Utility controller software
(HP Utility Data Center)

| Microsoft Windows System Resource Mgr | Open Source | HP-UX Workload Manager & Process Resource Manager |

Systems Insight Manager

New!

Management processor

Partition manager

| Smart setup DVD for Windows | Enablement kit for Linux | Ignite-UX, software Distributor-UX |

Windows Server 2003

hp-ux 11i

HP Systems Insight Manager
More stability and efficiency

Common management for

Servers
Clients
Power
HP Platforms (*)
Printers
Storage

(*) Multi-vendor environments via standards

OpenVMS
HP-ux 11
NonStop
Operating Environments (**)
Tru64
NetWare

(**) Can be managed from Linux, Windows, and HP-UX

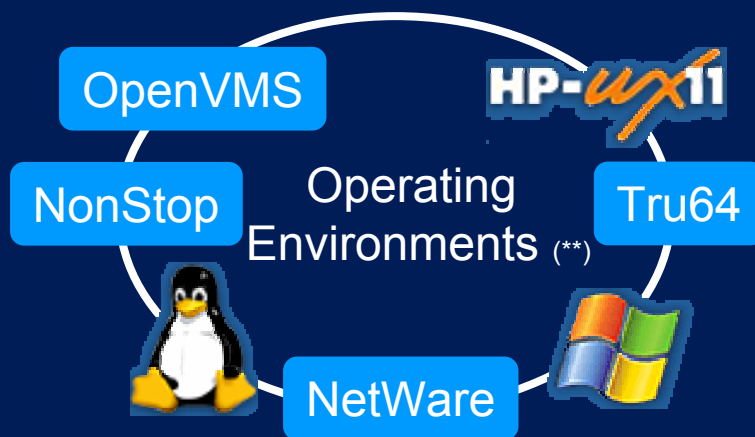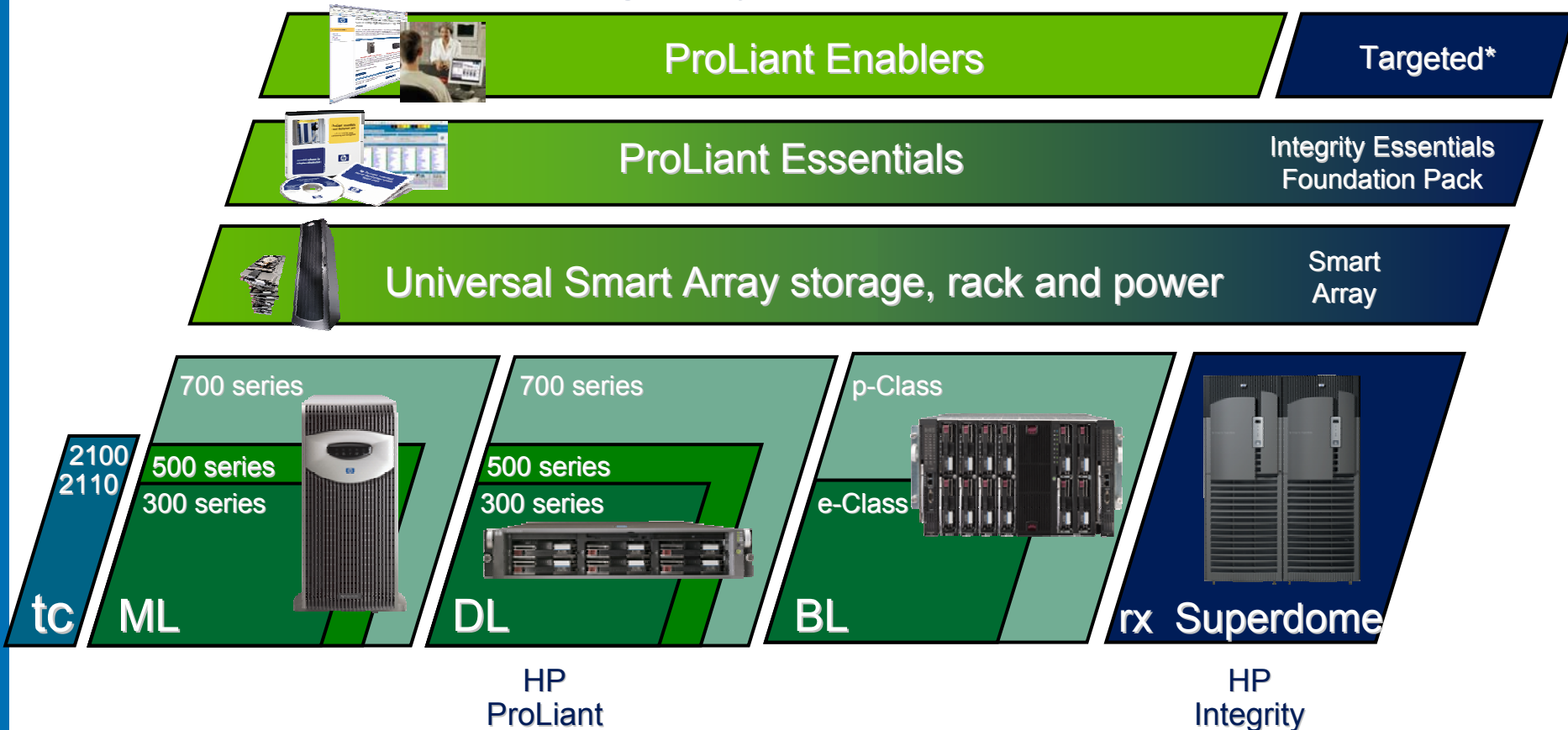### Comprehensive management through core services:

- Easy and rapid installation
- Smooth transition from Insight Manager 7 & Servicecontrol Manager
- Automatic discovery and identification
- Secure remote management
- Role-based security
- Distributed tasks
- Inventory management
- Fault management
- System software maintenance
- Web browser and command line
- Intuitive, easy-to-use user interface

hp-ux 11i

HP ProLiant management capabilities extend to Integrity servers

ProLiant Enablers | Targeted*

ProLiant Essentials | Integrity Essentials Foundation Pack

Universal Smart Array storage, rack and power | Smart Array

| 2100 2110 | 700 series / 500 series / 300 series (ML) | 700 series / 500 series / 300 series (DL) | p-Class / e-Class (BL) | Superdome |

tc   ML   DL   BL   rx Superdome

HP ProLiant

HP Integrity

HP Integrity servers for Windows customers with future ProLiant capabilities

With the broadest 64-bit Windows Server 2003 offering, HP Integrity Servers propel Windows further into the datacenter

- **Vertical scalability and performance up to 64 processors and 512 GB memory**
  - World leading SQL Server 2000 (64-bit) and application performance on HP Integrity servers up to 64p
  - Complementary HP Integrity and ProLiant server solutions delivered via an integrated and robust 32-bit and 64-bit Windows ecosystem

  - Best-in-class 64-bit Integrity server database and LOB solutions with major ISVs including Microsoft SQL Server, Oracle, SAP, i2,and SAS through joint engineering and collaboration

- **HP's enterprise Windows expertise ensures customer success**
  - 20 year HP/Microsoft partnership includes 8 years of joint Itanium-based solution development
  - HP Integrity servers are a Microsoft development platform for 64-bit Windows and SQL Server
  - HP Servers holds #1 Windows market-share revenue[1].
  - HP is the Market Leader for Windows services

[1]Source IDC Quarterly Server Tracker 3Q03

HP Integrity Servers for enterprise Windows environments

Demand more!

Agility

- World leading performance
- key portfolio of ISV databases and applications
- Breakthrough flexibility

RoIT

- Automated intelligent management
- Dynamic resource optimization
- Lasting value and investment protection

Accountability

- Best-in-class solution deployment with a complete, robust Windows ecosystem
- Unmatched high availability
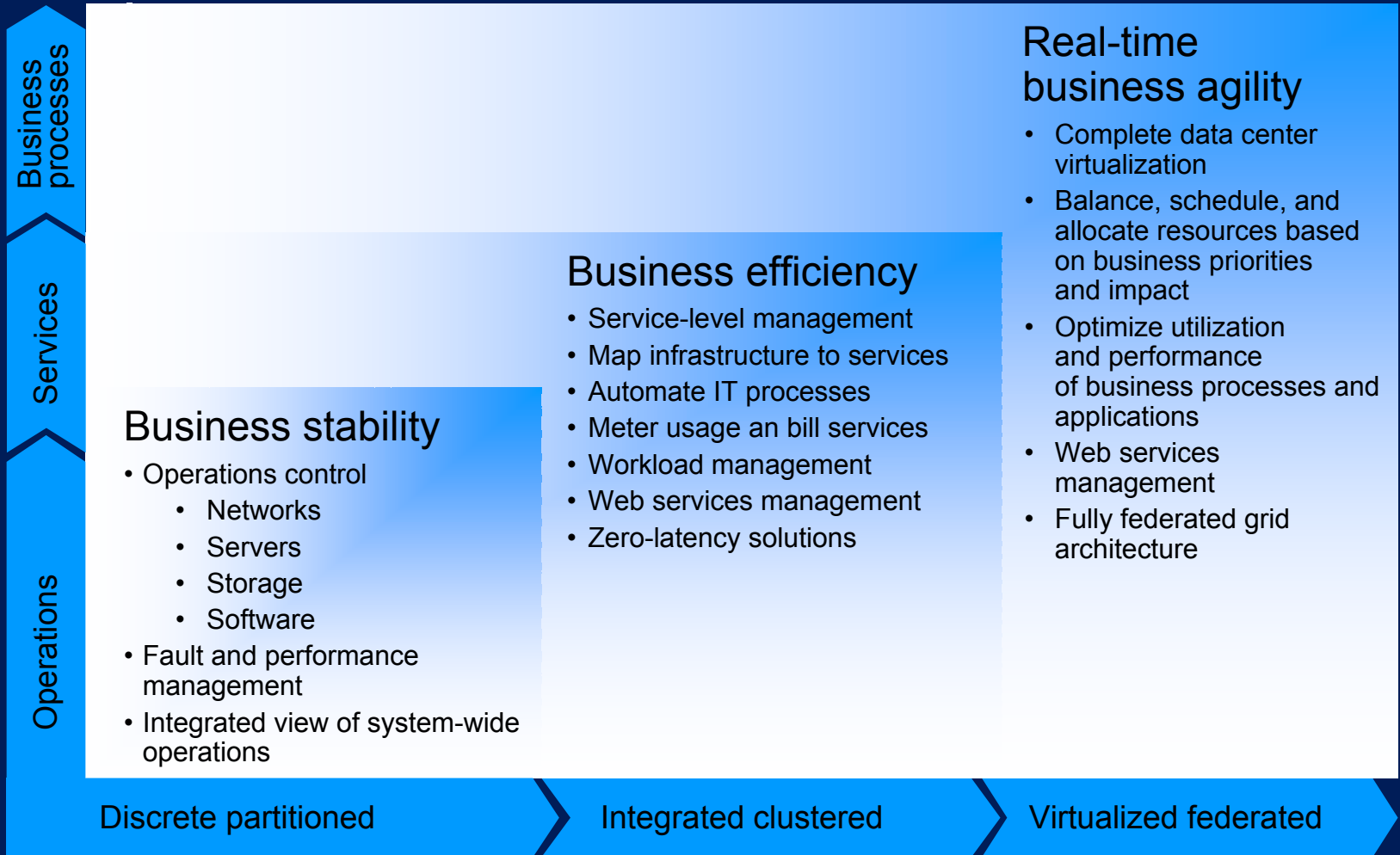- industry leading services and support

CIO challenges today

Restructuring

Drive costs down

Security

Support rapid change

Improve availability

Emerging applications

Performance

Mobility

Capacity

Heterogeneity

Consumption-based costing

Reduce complexity

Increase business relevance

Down down down

Distributed systems

Outsourcing

P&L contribution

Deliver services

In the adaptive enterprise, software controls infrastructure

Management & control (vertical axis)

- Business processes
- Services
- Operations

Business stability
- Operations control
  - Networks
  - Servers
  - Storage
  - Software
- Fault and performance management
- Integrated view of system-wide operations

Business efficiency
- Service-level management
- Map infrastructure to services
- Automate IT processes
- Meter usage an bill services
- Workload management
- Web services management
- Zero-latency solutions

Real-time business agility
- Complete data center virtualization
- Balance, schedule, and allocate resources based on business priorities and impact
- Optimize utilization and performance of business processes and applications
- Web services management
- Fully federated grid architecture

| Discrete partitioned | Integrated clustered | Virtualized federated |

Utilization
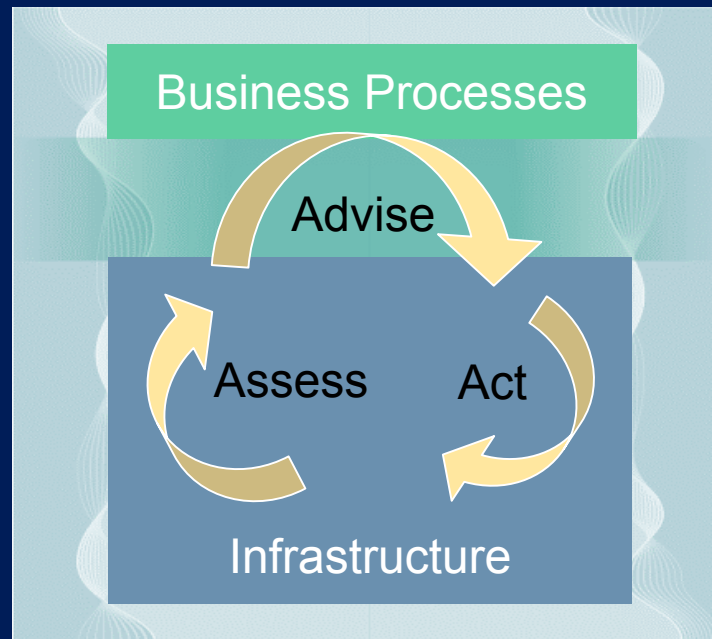
Adaptive management software
Guiding principles

Embrace reality

Control complex, heterogeneous environments

Deploy practical solutions for today

Anticipate innovation for the future

Deliver best return on IT

Business Processes

Advise

Assess   Act

Infrastructure

Enable agility

Align business priorities and IT systems

Adjust IT resources to business demand

Automate processes

Optimize service portfolio

Improve quality of service

Adaptive management

Business aware

Assess
Advise
Act

Service centric

Assess
Advise
Act

Operations centric

Assess
Advise
Act

HP OpenView
A complete portfolio of service driven management solutions.

**Utility controller software
(HP utility data center)**

**Workload management
Virtualizing the IT environment**

**System Level Management
Comprehensive multi-OS, multi-hardware platform management**

HP manageability today

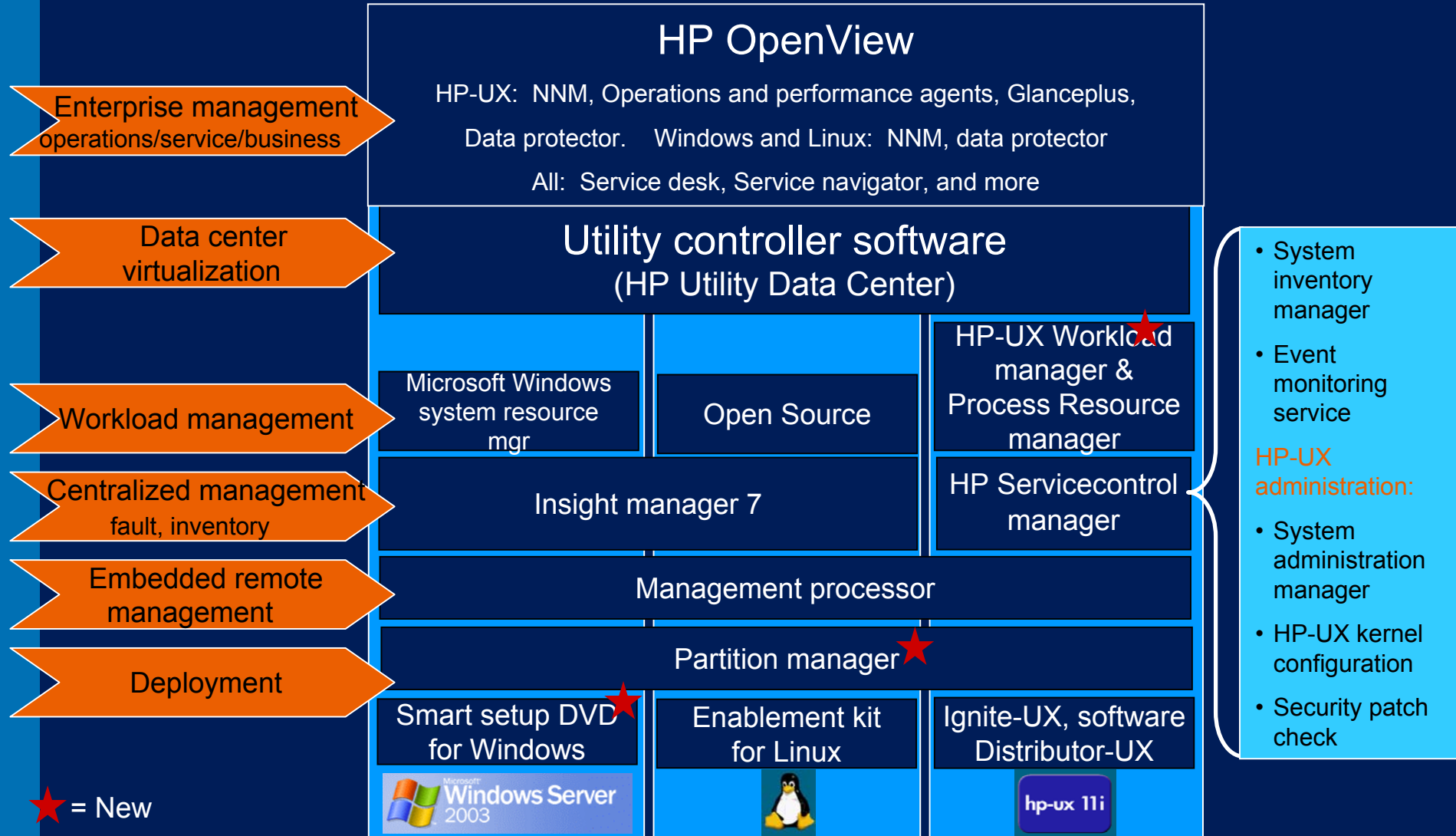|	
19,000,000	Online customers managed
4,000,000	Trading/bank accounts
1,500,000	Servers managed by Insight manager
135,000	HP OpenView installations
57,000+	Process resource manager & WLM licenses WW
70	% of internet devices managed
#1	UNIX workload management offering
10	Years enterprise management experience

Automated Intelligent Management
Management solutions for Integrity servers

HP OpenView

HP-UX: NNM, Operations and performance agents, Glanceplus,

Data protector.   Windows and Linux: NNM, data protector

All: Service desk, Service navigator, and more

Utility controller software
(HP Utility Data Center)

| Enterprise management operations/service/business | |
| Data center virtualization | |

Microsoft Windows system resource mgr	Open Source	HP-UX Workload manager & Process Resource manager ★
Insight manager 7		HP Servicecontrol manager
Management processor		
Partition manager ★		
Smart setup DVD for Windows ★	Enablement kit for Linux	Ignite-UX, software Distributor-UX

- Workload management
- Centralized management fault, inventory
- Embedded remote management
- Deployment

- System inventory manager
- Event monitoring service

HP-UX administration:

- System administration manager
- HP-UX kernel configuration
- Security patch check

★ = New

Windows Server 2003

hp-ux 11i

Windows server management for Integrity servers

- HP integrity essentials foundation pack for windows includes:
  - HP smart setup DVD
  - HP insight manager 7

- HP management processor

Smart Setup DVD
(Part of the HP Integrity essentials foundation pack for Windows)
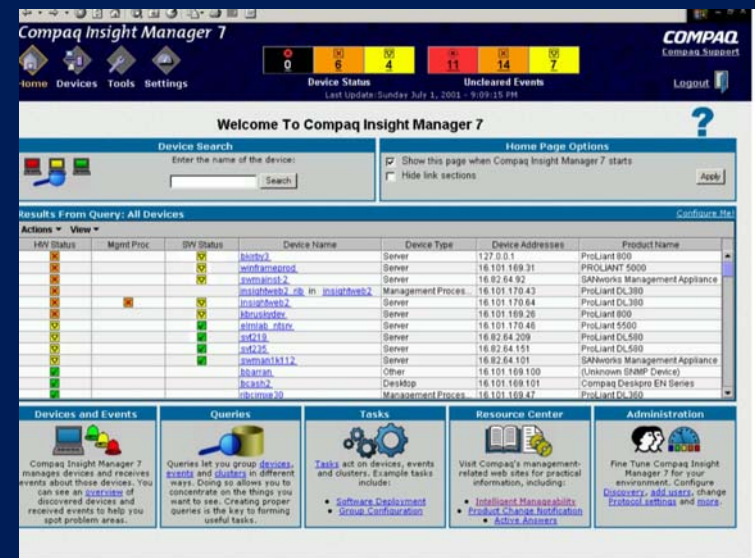
- Why use it?
  - Deploy Windows servers quickly and easily
  - Improve productivity
- What does it do?
  - Provides all that is needed to set up and configure HP Integrity servers with Windows with a look and feel like SmartStart.
  - DVD includes agents, firmware, drivers, system and OS documentation and support diagnostics
  - Includes the EFI based setup utility (EBSU) which enables users to:
    - Create hard disk partitions
    - Flash system and i/o card firmware
    - Configure RAID
    - Use Intel disk tools to partition, format and verify hard disk drives

New!

Note: The Smart Setup DVD for Superdome does not include the EBSU.

Insight manager 7

- Why Insight manager 7?
  - Integrated management of Itanium2 and IA32 platforms
  - Ease of use
    - Access through a web-browser anytime and anywhere

- What does it do for Integrity servers?
  - Discovery
  - Identification
  - Alerting
  - Inventory reports

- What doesn't it do?
  - Version control
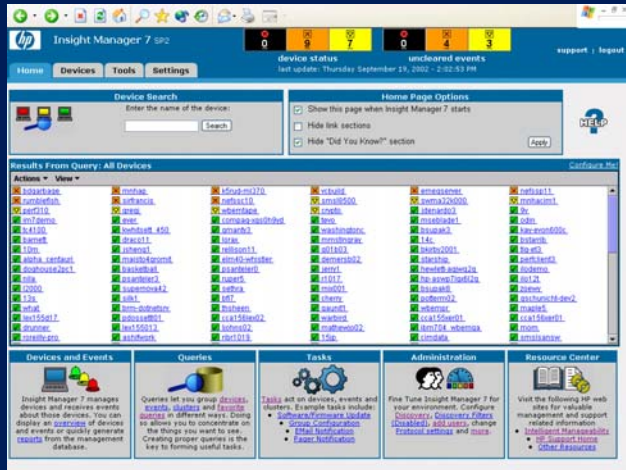 - System management home page (except high end Windows servers)

Insight Manager 7
Theory of operation

Response
- Browser-based remote access
- Access from anywhere
- Proactive tasks

Notification
- Visual alerts
- Phone alerts
- Email alerts
- User defined thresholds

Web-enabled agents for Windows, Linux, NetWare, OVMS, Tru64 servers, Windows clients.

SNMP agents for Integrity servers with Windows and Linux.

Standards-based support through SNMP & DMI for third party devices.

Secure link
128 bit
SSL encryption

Disk subsystem
- Drive configuration
- Capacity utilization
- Performance
- Array controller health
- Asset information
- Prefailure warranty

Processor
- CPU utilization
- Processor state
- Temperature
- Prefailure warranty
- Asset information

Memory
- Memory configuration
- Speed and type
- Prefailure warranty

Managed server
- Vendor
- Model number
- Physical location
- Asset information
- Operating system

Network adapters
- Link through-put
- Packet error rate
- Controller failure
- Asset information

Environment
- Internal temperature
- Fan operation

PCI adapters
- Adapter configuration
- Asset information

Insight manager 7
Proactive fault management

- Insight Manager 7 detects problems before they result in server downtime.
  - Provides pre-failure alerting for disks and memory on select systems
  - Monitors fans, PCI options, and server environmentals
- Insight Manager 7 speeds failure diagnosis and resolution.
  - Status drill down leads the way to failed components
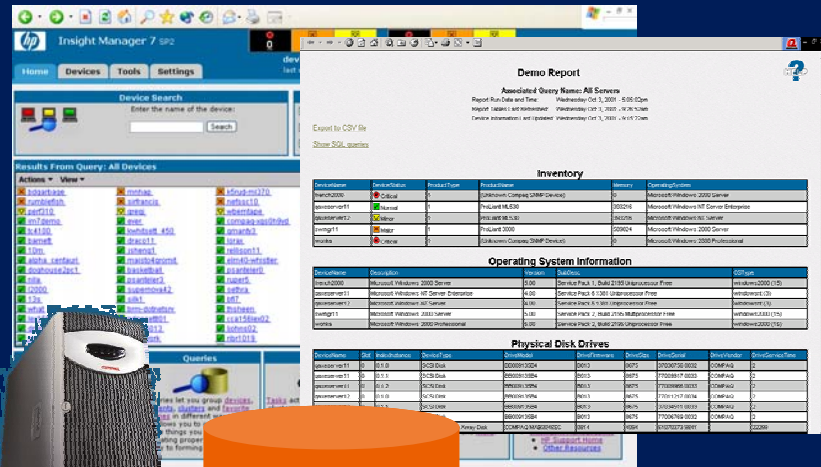 - Enables remote event notification
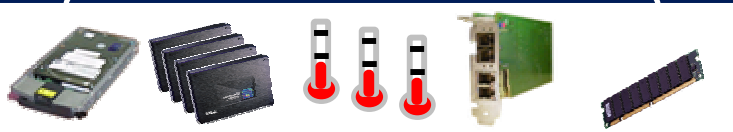
* Based on xxxx servers   Details

Insight manager 7
Comprehensive inventory reporting

SQL server

- Insight manager 7 simplifies asset management
  - Data collection catalogues systems and system configurations
  - Build custom reports with report creation wizard
  - Reports can be saved and exported
  - Direct access to SQL database tables supported

Next generation systems level management

- Enhanced functionality based on a single management architecture and application for HP-UX, Linux and Windows
  - Unifies industry-leading technologies from Insight manager, Toptools and Servicecontrol manager
  - Delivered as an upgrade to Insight manager and Servicecontrol manager
  - Easy-to-use system level management for highest efficiency
  - Modular, customizable structure for maximum flexibility
  - Standard-based for optimum integration
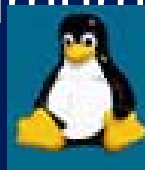
HP-UX 11i

Windows & Linux system level management
The competitive advantage

	HP	Dell	IBM
Most widely used management software provided by server vendor	Yes	No	No
Integrity server SNMP agents available	Yes	?	No!
Manage 3rd party systems	Yes	Limited	Limited
Browser-based access to management console	Yes	Yes	No
Multi OS system level management direction	Yes	No	No
Detailed inventory reporting	Yes	Limited	Yes

What?!?

HP Integrity Servers

Record Breaking Performance

Across multiple benchmarks
Across multiple servers
Across multiple operating systems

32 record

benchmarks since

the Madison launch

Featuring new results for Intel® Itanium® 2 processor 1.50 GHz with 6M L3 cache

Performance Results

- ## HP Integrity Superdome
  - <u>World record</u> tpmC of 824k at $8.28/tpmC HP-UX Oracle 10i 64 CPUs, available 12/31/03
    - <u>Beats IBM p690 with their latest</u> 1.7 GHz Power4+ chip! *

  - SPECjbb 1,008,604 (64-way)   (Java business benchmark)
    - 82% higher than IBM
    - 67% higher than Sun (104-way)
  - SPECjbb 574,912 (32-way)
    - Beats IBM p690 Processor for Processor   (IBM p690 - 553,480 32 –way)

* IBM p690 763,898 at

$8.31/tpmC available 11/08/03

Performance Results

- ## rx5670 (4-way)
  - ### World record 4 way TPC-C result
    - HP-UX 11i v2 tpmC of 131,639 at $7.25/tpmC

    Available 12/31/03

  - ### World record 4-way Oracle Applications Standard Benchmark (OASB) on UNIX (HP-UX) 6,440 concurrent users

  - ### World record Oracle Applications on Linux at 5,992 concurrent users

Performance Results

- ## rx2600 (2-way)

  - ### SPECweb99_SSL 1,930
    - <u>World record</u> 2-way result
    - Great for web applications with security

  - ### SPEC fp_base2000   2,119
    - No. 1 result
    - Great for large clusters with complex workloads

HP Integrity Superdome *Windows Server 2003 Update*

- Repriced due to price reductions since 5/20 windows TPC-C benchmark
  - Now: $7.16/tpmC !!

- Reminder: HP Integrity Superdome holds the <u>world Windows tpmC record</u> of 707k at $7.16/tpmC Windows Server 2003, Datacenter edition with SQL Server 2000 (64-bit) 64 CPUs available 10/24/03 *

* Second place NEC 5800 514,034 $11.50/tpmC

Available 10/22/03

What does all this performance mean?

Superdome

Leadership performance <u>over IBM</u> p690 at the high end

    <u>Unix</u> tpmC   #1 in the world

    <u>Windows</u> tpmC   #1 in the world (IBM p690 doesn't even   run windows)

rx5670 (4 CPU)

Leadership performance <u>over IBM</u>

    tpmCin general   <u>World record</u> for 4-way servers

    Unix tpmC   #1 4-way result

    Windows tpmC   #1 4-way result

What does all this performance mean for customers?

Plenty of power

to get your job done

- Ample headroom to meet unexpected peak loads
- Helps meet service level objectives and keep end users happy
- Support for more concurrent users, more complex applications, more transactions, more …

- ## Strong Investment protection

- Redeploy with multi OS
- Select applications regardless of OS
- In-box upgrade from PA-RISC to Itanium

- End user friendly

- IT budget friendly

Impact of recent Itanium benchmarks

- Itanium CPUs with HP servers provide leadership performance

- Itanium-based HP Integrity servers are consistently beating IBM

- Itanium CPUs are pulling ahead of all comers
  and . . . We are just at the beginning of the Itanium chip rollout

  . . . Intel plans to produce a new Itanium chip every 12 months
    - IBM and Sun are falling behind in this vital performance and multi OS race

- World record performance AND multiple operating systems (multi os)
  - Most customers use multiple OSs and HP recognizes and embraces this multi OS world
    - UNIX
    - Linux
    - Windows
    - OpenVMS (future plans)

What's behind these benchmarks?

- Intel® Itanium® 2 processor 1.50 GHz with 6M L3 cache performance

  . . . But that's not the whole story

- Itanium processors, like all processors, need a chipset to tie together memory, I/O, and an interconnect switch and HP has two high performance chipsets

  - zx1 (for the low end)
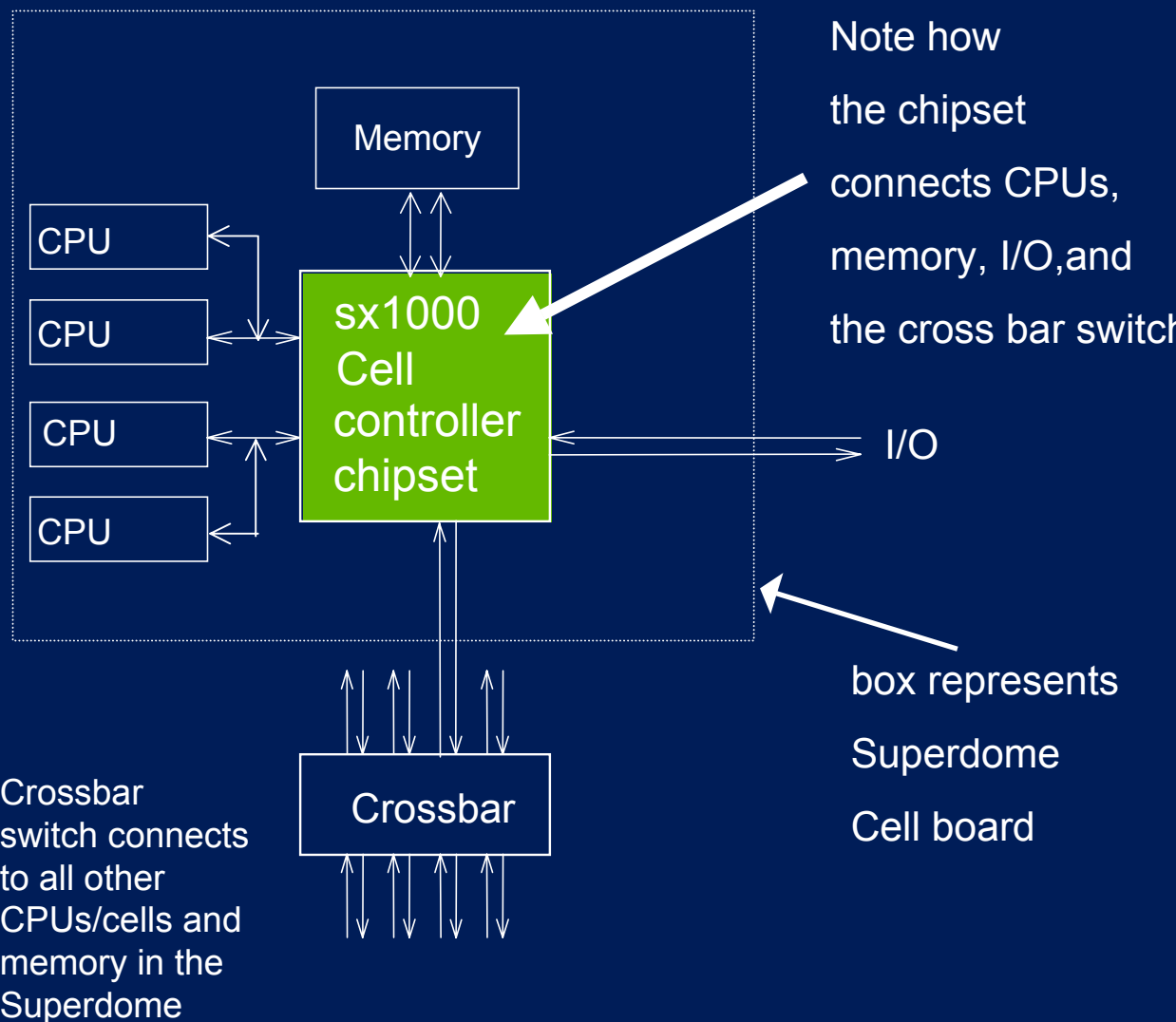 - sx1000 (for the high end)

High Performance Server	=	High Performance Processors	+	High Performance Chipset
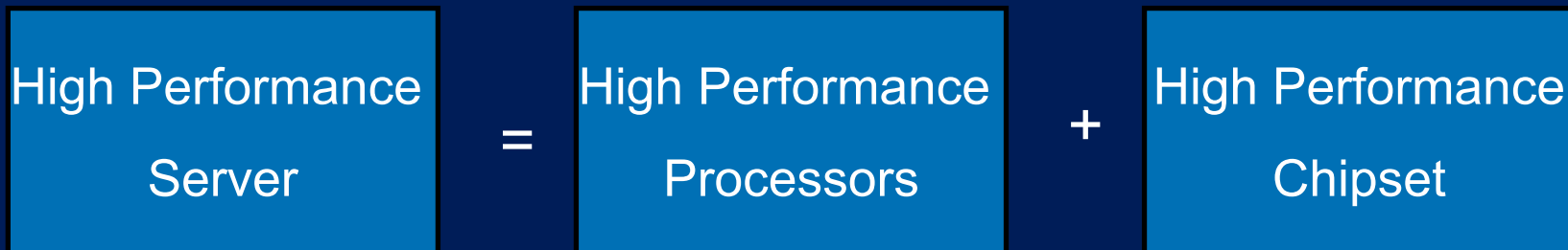
HP sx1000 chipset—optimized for use with a large numbers of processors (up to 64)

HP Integrity Superdome example

A high-performance CPU needs a high-performance chipset.

Memory

CPU

CPU

CPU

CPU

sx1000 Cell controller chipset

I/O

Crossbar

Crossbar switch connects to all other CPUs/cells and memory in the Superdome

Note how the chipset connects CPUs, memory, I/O,and the cross bar switch

box represents Superdome Cell board

HP zx1 chipset—optimized for 1 to 4 processors

15-20% faster than competitors Itanium 2

chipsets due to:

- Highest memory bandwidth
- Lowest memory latency
- Largest memory capacity
- Biggest I/O bandwidth and capacity
- Best scalability
- Leadership reliability with multi-bit ECC memory correction

Memory

CPU

CPU

zx1
Cell
controller
chipset

CPU

CPU

I/O
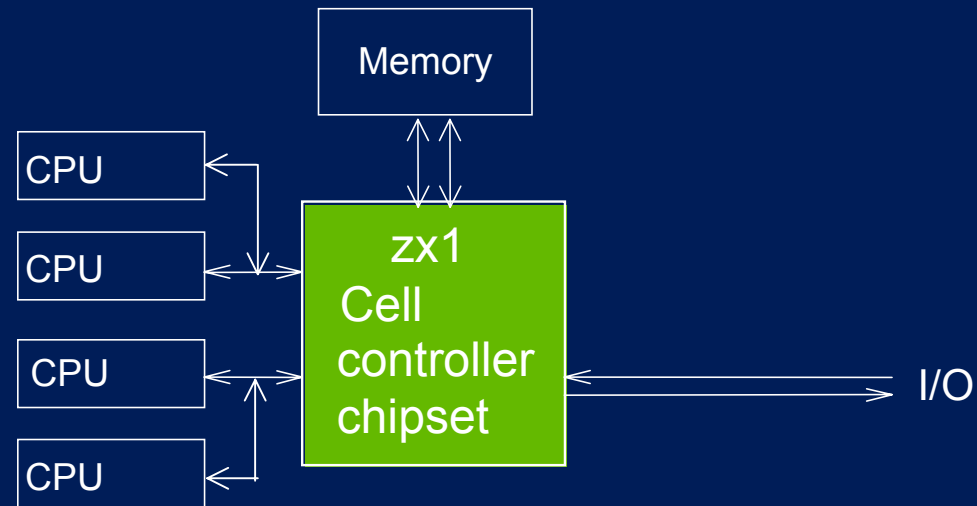
HP's zx1 chipset unleashes the full power of Intel® Itanium® 2

processor across 1-4 processor systems

HP Chipsets

- Are an HP core competency

    - Solid engineering tradition

- Provide higher performance vs. the competitors

- Bring out the best in the Itanium processors
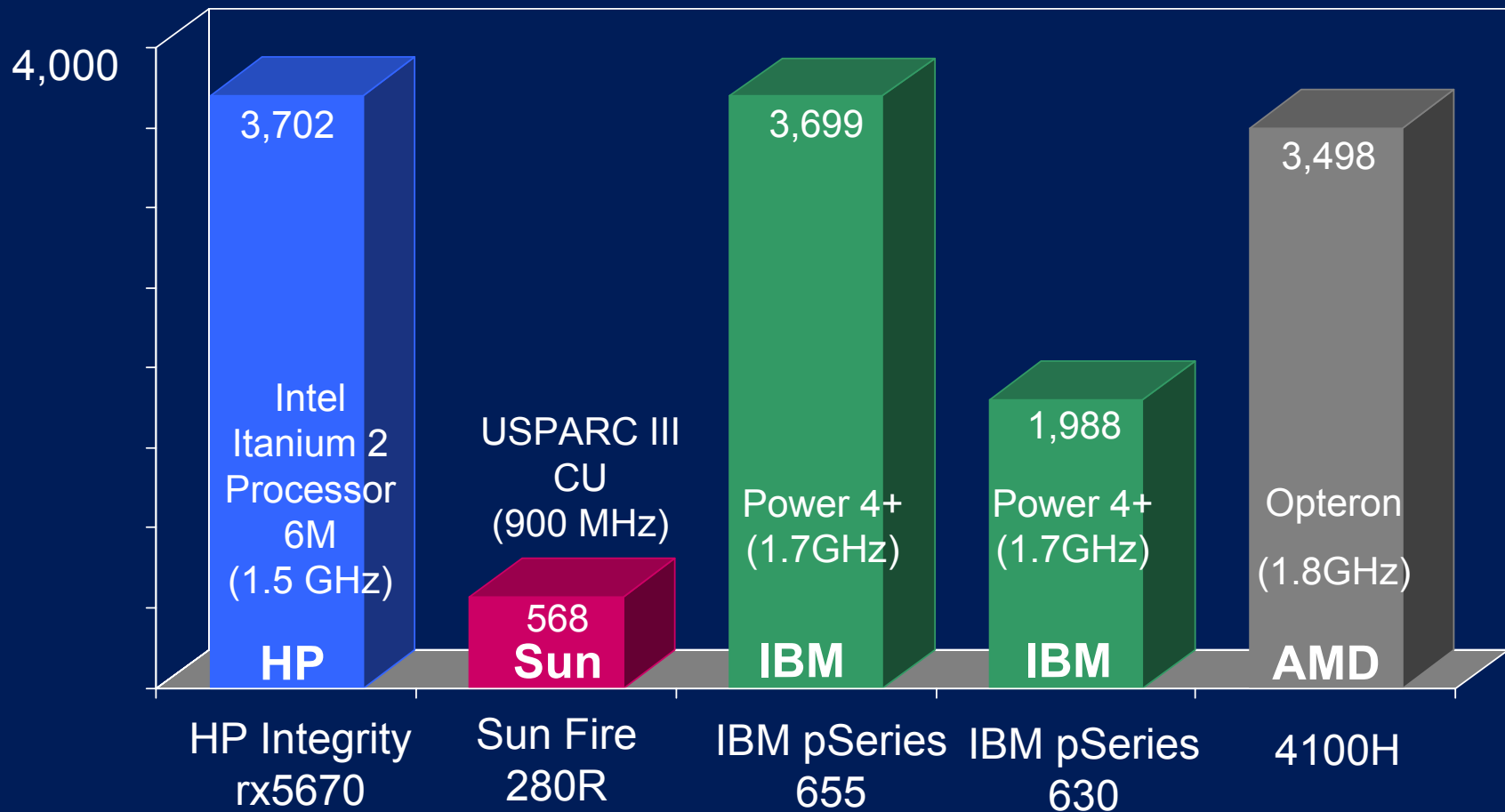
World Record SPECfp_base2000 Results

Base

IA-64 | IA-32 & Extensions | RISC

2119	1267	1122	1053	1598	1047	953
HP	Dell	AMD	Dell	IBM	Fujitsu	Sun
Intel Itanium 2 Processor 6m 1.5 GHz	Intel Pentium 4 3.2 GHz	AMD Opeteron 1.8 GHz	Intel Xeon 3.06 GHz	IBM Power 4+ 1.7 GHz	SPARC64 V 1.35 GHz	Sun Ultra-SPARC III 1.2 GHz
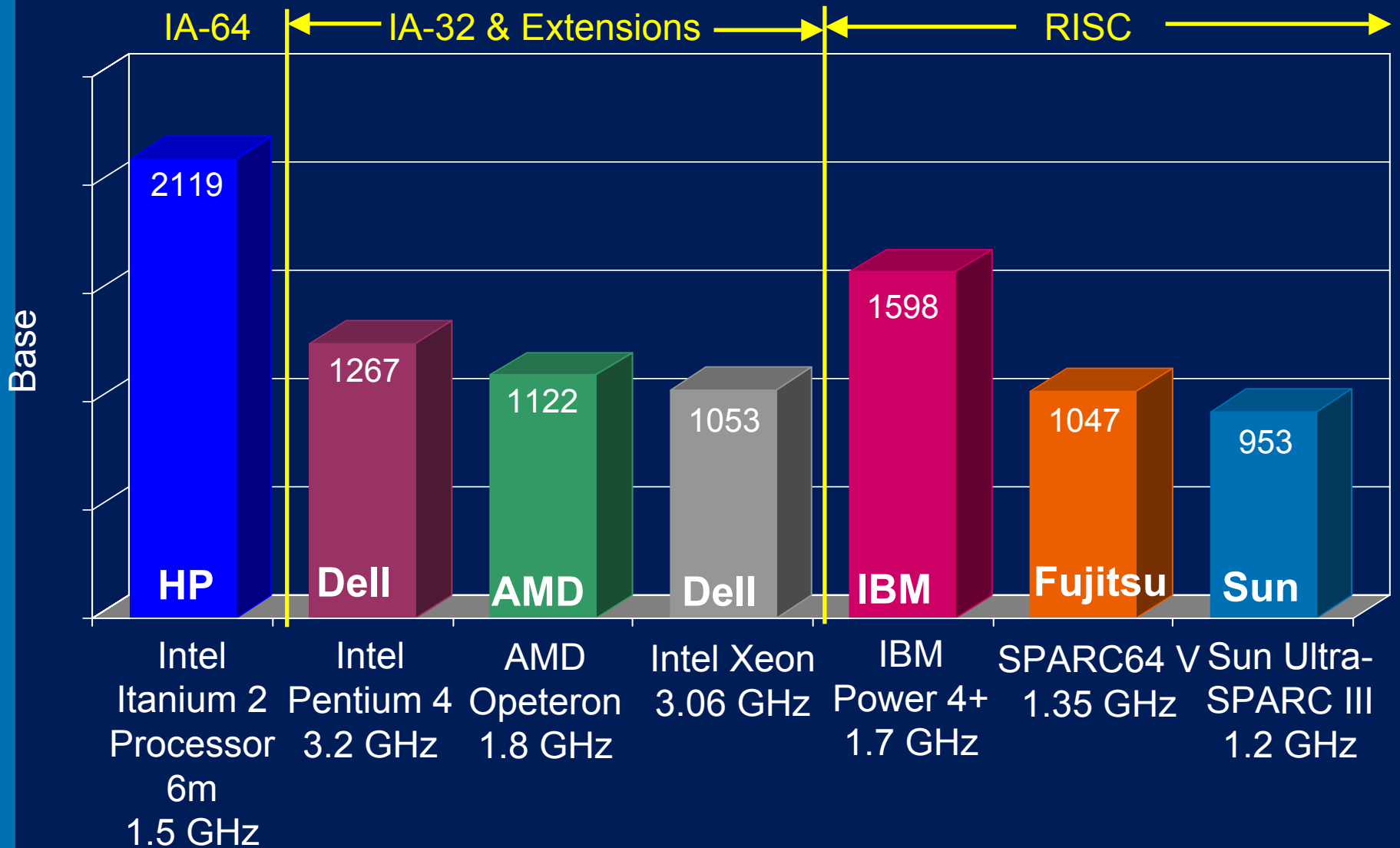
Superdome: Proven investment protection with in-box performance upgrades (trans./min)

Bar chart — tpmC:
- PA-8600: 197,024
- PA-8700: 389,434
- PA-8700+: 541,674
- Itanium2:Win: 707,102
- Itanium2:HPUX: 824,164
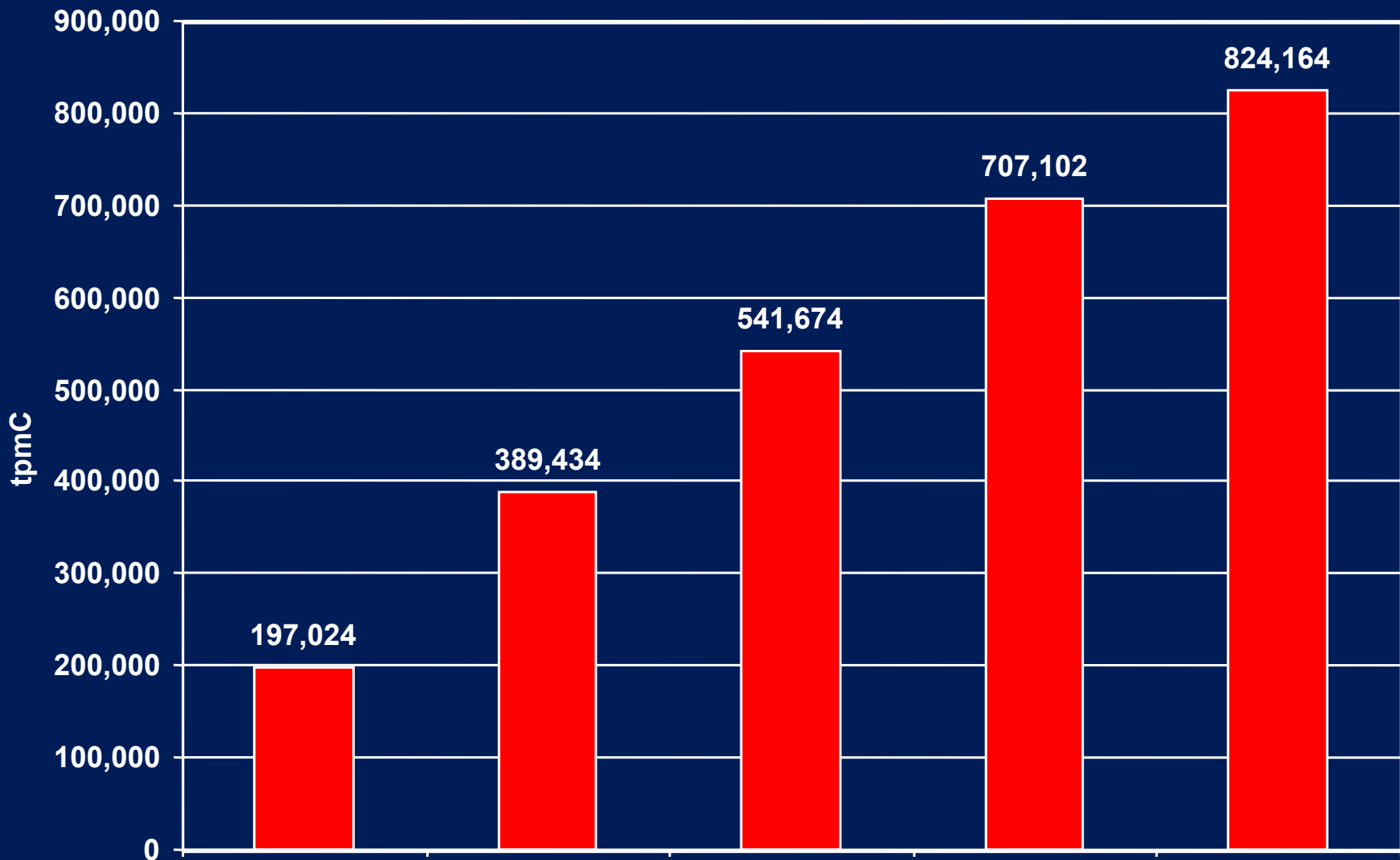
HP Integrity rx5670: Fastest 4-way SPECweb99_SSL results

4,000

HP Integrity rx5670	Sun Fire 280R	IBM pSeries 655	IBM pSeries 630	4100H
3,702	568	3,699	1,988	3,498
Intel Itanium 2 Processor 6M (1.5 GHz)	USPARC III CU (900 MHz)	Power 4+ (1.7GHz)	Power 4+ (1.7GHz)	Opteron (1.8GHz)
HP	**Sun**	**IBM**	**IBM**	**AMD**

Performance Summary

- Itanium2-based HP Integrity Servers have set many world records across multiple OSs and multiple applications

- Itanium 2 processors have pulled away from IBM Power4+ CPUs

- Itanium processors are just beginning with new ones being developed every 12 months

- Itanium processors & HP chipsets provide the basis for multi OS servers

- Multi OS servers provide
  - Maximum investment protection
  - Maximum redeployment capability
  - Maximum agility for the enterprise

Independent Software Vendors (ISV) Solutions for the HP Integrity servers

November 2003

So what is the real story, for ISVs on HP Integrity servers?

Market adoption, crossing the chasm!
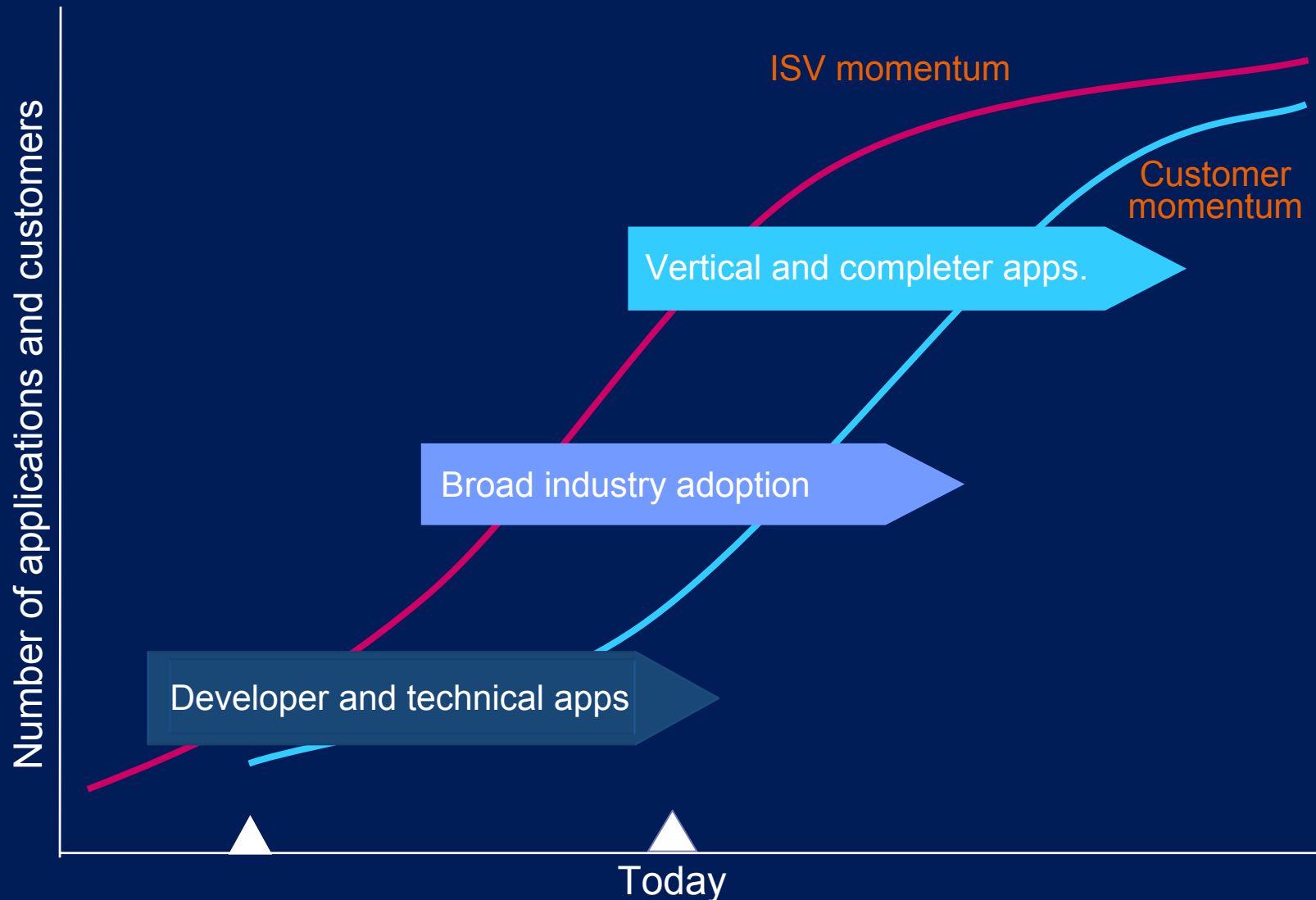
HP has a well planned ISV strategy: 18-month effort in multiple phases

Intel®Itanium®-based system adoption

Phase three: Expand the reach
- Accelerate entry in new markets
- Drive broad adoption
- Migrate customer requested apps

Phase two: Extend portfolios
- Drive key market leader adoption
- Complete transition of vendor ecosystem
- Engage global sales to begin solution development

Phase one: Build the foundation
- Technical market applications
- Joint engineering with market anchors
- Deliver core development tools to developers

CY02   CY 03   CY04

Itanium® based systems ship   Itanium 2-based systems ship

Availability of applications on HP Integrity servers is racing ahead!

HP-UX:
- Technical computing ISVs adopting HP Integrity servers for high performance
- Leading commercial ISVs leveraging scalability, price/performance
- Broader ISV community taking advantage of special HP programs

- 100+ High Performance Technical Computing ISV applications committed
- 99+% of top commercial ISVs committed
- All leading databases by end of year
- Strong BI, ERP, NSP, Infrastructure Portfolios
- HP Integrity Power Partner Program
- Customer focus program

Windows:
- Leading commercial ISVs taking advantage of the power of HP Integrity servers to extend further into the data center
- Wider ISV community leveraging HP programs

- Focus on 64-bit SQL & SAP seed programs
- Top partners on board
- Developer & Solution Partner Program (DSPP) leveraged for broad adoption
- HP Integrity Power Partner Program

Linux:
- ISVs in key markets taking advantage of the power of HP Integrity servers

- Key market segments include high perf. Tech. computing, databases, app. development

OpenVMS:
- Transition partner base

- Over 400 partners have stated intent to support architecture

HP extends Windows further into the data center through industry partnerships

- Based on joint engineering & collaboration, HP delivers best-in-class 64-bit Integrity server solutions with major Windows ISVs: Microsoft, Oracle, SAP, SAS

- Certification of 64-bit SQL Server with 32-bit applications from partners including: ARGO, PeopleSoft, Siebel Systems, more coming..

- Vertical scalability up to 64 processors and 512 GB memory

- World leading Windows/SQL performance on HP Integrity servers
  - Windows performance of 786,646 tpmC at leading high-end price-performance of $6.49'
  - Integrity rx5670: #1 4-way Windows TPC-C performance of 121,065 tpmC at $4.79[2]

Expanding HP's complete and robust ecosystem from 32-bit Windows to 64-bit Windows

Database solutions

IBM — DB2 UDB V8.1
Microsoft SQLServer 2000 Enterprise Edition (64-bit)
ORACLE — Oracle 9i Database

Complex LOB solutions

ARGO Data Resource Corporation
PeopleSoft — PeopleTools/Apps
SAS — SAS v9
SAP
SIEBEL

IT Infrastructure solutions

bmcsoftware — Smart DBA
bea — WebLogic JRockit 8.1 SDK
Computer Associates — eTrust 7
LEGATO — NetWorker 7
symantec — AntiVirus Corp Edition
VERITAS — NetBackup 4.5

Application portfolio is growing rapidly!! 10/15/03

	Now		January '04		July '04 est.	
ISV Group	ISVs	Apps	ISVs	Apps	ISVs	Apps
Development tools, completers	65	124	97	205	97	205
HPTC	35	104	55	178	55	178
Linux	120	184	120	184	120	184
Windows	97	150	97	150	97	150
Top Commercial	36	137	60	331	71	422
Open Source	24	178	24	178	24	178
DSPP & Regions	59	79	386	463	386	463
OpenVMS	2	3	11	19	239	501
Totals	438	959	850	1708	1089	2281

ISV and application counts are actual known commitments and not estimates, thus counts beyond January are significantly understated as no application are added beyond what is already known

Why is the market interested in HP Integrity systems

Why HP

HP delivers:

- Flexible and "future-proof" infrastructure
  - Long term roadmap
  - Re-deployable

- Complete range of scalable, high-performing Itanium 2-based systems

- Multi-operating system capabilities and support

- Comprehensive manageability, HA and security

- Full ecosystem including services across the IT lifecycle

- Broad range of ISV software and System Integrators to help design, develop, and deploy solutions

Why Itanium

Performance

New generation

Itanium® architecture

Superscalar RISC

RISC

CISC

20-30% increase per year due to advances in underlying semiconductor technology

Time

Demand More!

Agility

RoIT

Accountability

Building the adaptive enterprise with industry standards, unique value
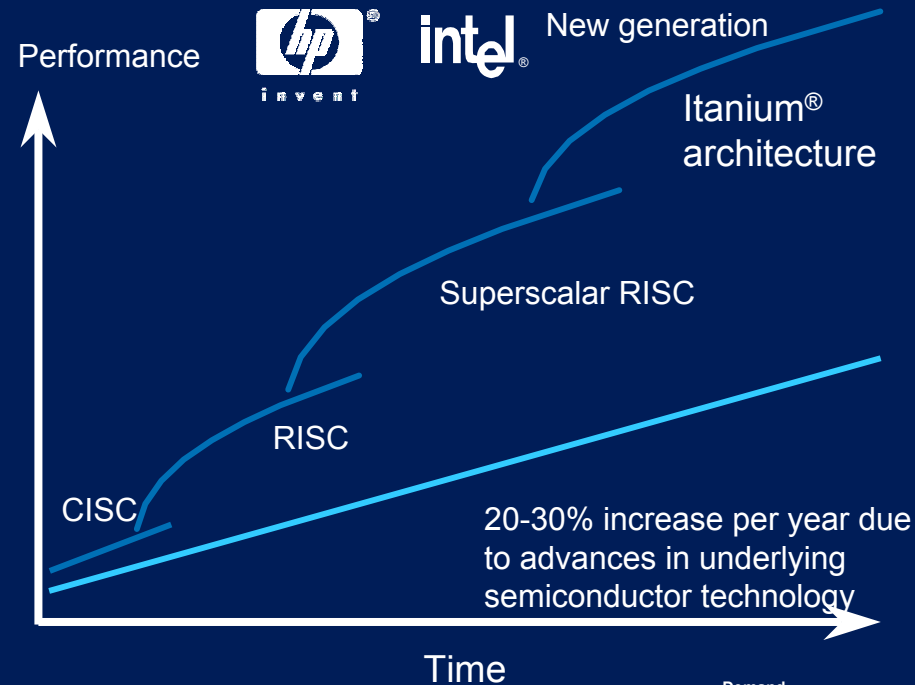
The value of HP Integrity servers to software vendors

Vendor	Description
bea	Increases business performance, with outstanding scalability, to accommodate growing demands
LAWSON	HP Integrity servers allow Lawson to deliver to customers better overall application performance at a lower total cost of ownership
manugistics	We are seeing an initial performance increase of 40% running on HP Integrity systems which means much better price performance for our customers
Microsoft SQL Server 2000 Enterprise Edition (64-bit)	With up to 64-way Integrity servers, Microsoft SQL Server delivers the highest scaling database server for top Windows performance with data center applications
ORACLE	Industry-leading performance with Oracle Database 10*g* for both the HP Integrity Superdome (HP-UX) and the HP Integrity rx5670 (Linux)
SAP	With HP Integrity servers, even the most compute-intensive SAP Business Information Warehouse (BW) will benefit from the increased scalability and processing power
sas	SAS takes advantage of the balanced architecture of Integrity servers, delivering excellent floating point and I/O performance
SIEBEL	HP Integrity 4-way benchmark running Microsoft SQL Server (64-bit) delivers cost effective enterprise performance supporting 12,000 Siebel eBusiness application users

ISVs for HP Integrity servers – how many are "enough"?

- First, there is a big difference between the number of applications versus the number of ISVs

- Most importantly, it is not how many you have but do you have the right ones
  - Top applications have the greatest impact on customer acceptance
  - Current market leaders in solution segments

- HP's focus: get the applications that people want and get them running!!
  - get the lead commitments, then resolve the completers necessary to run at a customer site
  - Be prepared to quickly port customer requested applications with Must Win Program

- Today there are fewer ISVs with more applications
  - Big partners have gotten bigger and expanded application coverage
  - Tremendous consolidation in the industry

- We have the leaders and we are prepared to get the rest
  - Database: Oracle, DB2, Informix, Sybase, Ingres
  - ERP: SAP, PeopleSoft, Siebel, JDE, Lawson, Baan
  - MW/EAI: BEA, IBM, Oracle, webMethods, Tibco, SeeBeyond, Iona

> We have both:
> All the top ISVs and thousands of applications in sight

ISV status summary

- Overall the ISV population for HP Integrity servers is large and increasing rapidly – the applications are here!

- Technical solutions and background tools in place

- Strategy/results: rapid expansion of market leading solutions roll into place through CY04

- Broader ISV community now coming onboard

- ISVs are now seeing customer demand for Integrity servers and winning deals

Demand more!

RoIT

Agility

Accountability

Where can I find more information?

- More information on Integrity servers from HP:
  - www.hp.com/go/integrity
  - www.hp.com/go/itanium

- More information on HP's Operating Systems:
  - Windows: www.hp.com/go/windowsserver2003
  - Linux: www.hp.com/Linux
  - HP-UX: www.hp.com/products1/unix/operating/index.html
  - OpenVMS: www.hp.com/go/openvms

- More information on Microsoft Corporation:
  - www.microsoft.com/windowsserver2003/64bit/enterprise.mspx
  - www.microsoft.com/windowsserver2003/partners/isvs/64bitisvs.mspx

- More information on Itanium processors from Intel:
  - www.intel.com/products/server/processors/server/itanium/index.htm?iid=sr+itanium&

- More information on Redhat / UnitedLinux:
  - www.redhat.com
  - www.europe.redhat.com/news/article/269.html
  - www.unitedlinux.com

- More information on HP's Developers & Solution Partner Program (DSPP):
  - www.hp.com/dspp