



Herbstevent der „Itanium® and Integrity SIG“

Intel® Itanium® Processor Family Update

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Intel® Itanium®2 Processor Advantages

Maximum OS Flexibility


Windows*, Linux or UNIX
(HP-UX*, MIPS*, VMS*, Solaris*, z/OS*, OS/390* ...)

One architecture, so many choices
Now featuring over 10,000 applications

Highest Scalability

Scalable to 512p

Intel® Xeon® limited to 32p
AMD Opteron* limited to 8p



Published SPECJBB2005 benchmark²

Mainframe Class Reliability

IT Benefit

Data Error Protection

Data Integrity

Info Security

Feature

Intel® Cache Safe Technology

Advanced machine Check Architecture

Memory Compartmentalization

Intel only

Itanium only

Demonstrated 7 9's of Availability


Highest Available Performance¹

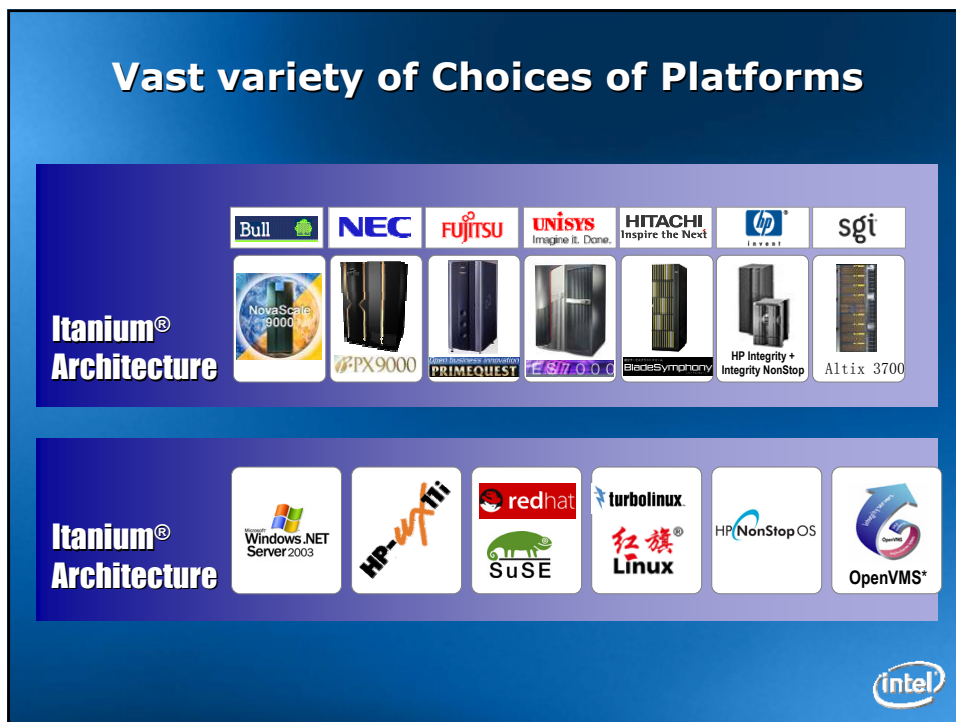
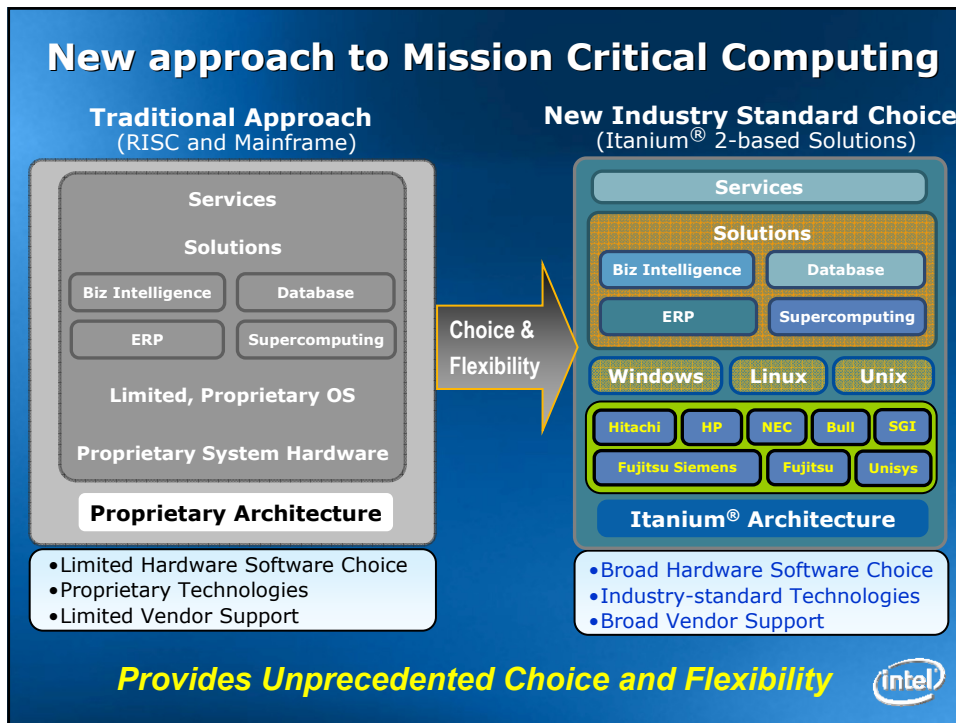
World Records!

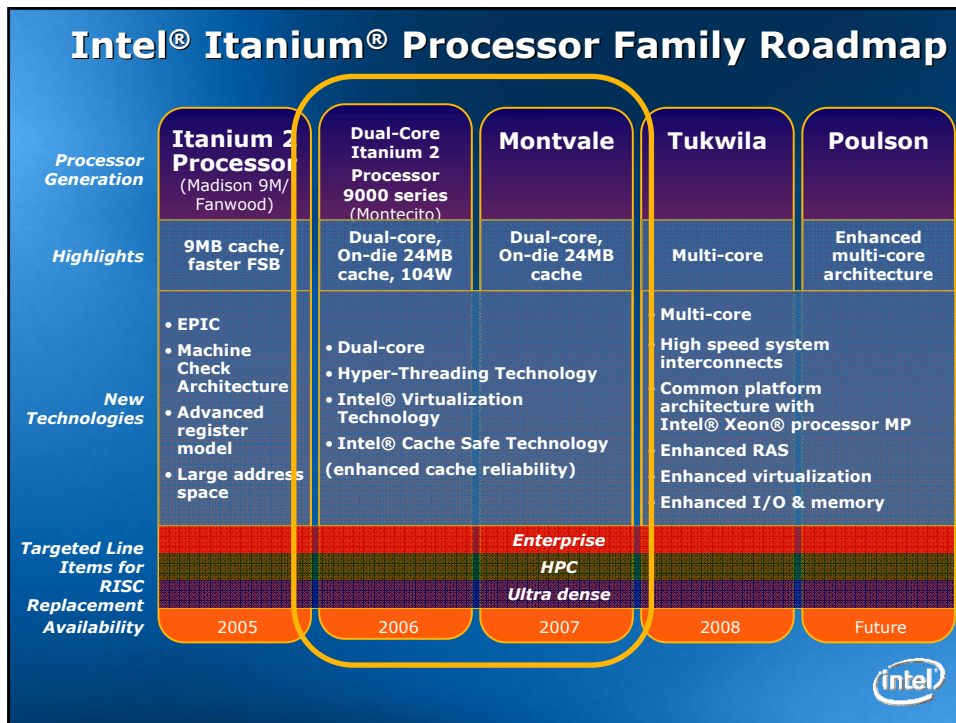
Integer <small>SPECint_rate_base 2000 - 256C</small>	4230
Floating Point <small>SPECint_fprate_base 2000 - 256C</small>	4937
Web Servers <small>SPECjbb2005 - 256C</small>	3772
App Servers <small>SPECjappsvr2004 - 32C</small>	4915

¹ Data Source: Based on SPEC[®] publication as of July 18, 2006 using Dual-Core Intel® Itanium®2 Processor 9050. See <http://www.intel.com/performance> for more details.
² Data Source: www.spec.org as of July 18, 2006. See backup or <http://www.intel.com/performance> for configuration details.


Actual Results may vary. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit <http://www.intel.com/performance/resources/limits.htm> or call (U.S.) 1-800-628-8686 or 1-916-356-3104.
Itanium® is trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. *Trademarks by respective owners.



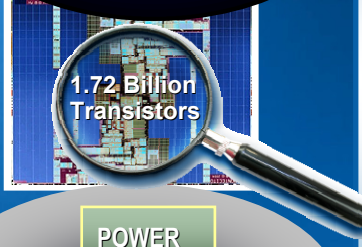





Dual-Core Intel® Itanium® Processor 9000 Series



PERFORMANCE
2X*
HIGHER



1.72 Billion
Transistors



POWER
20%*
LOWER


New features for performance

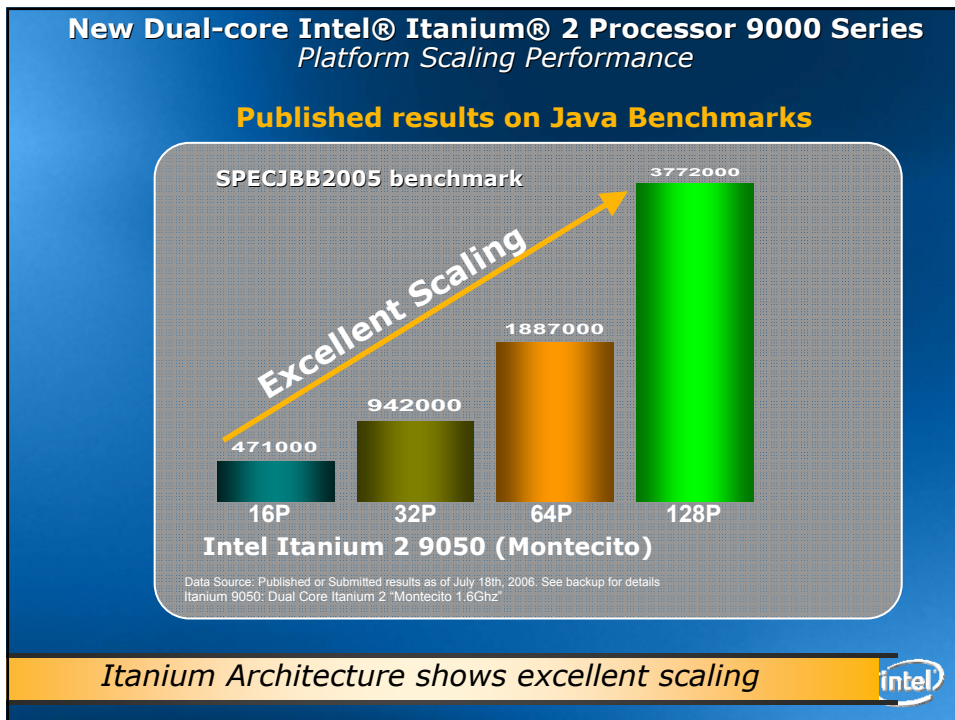
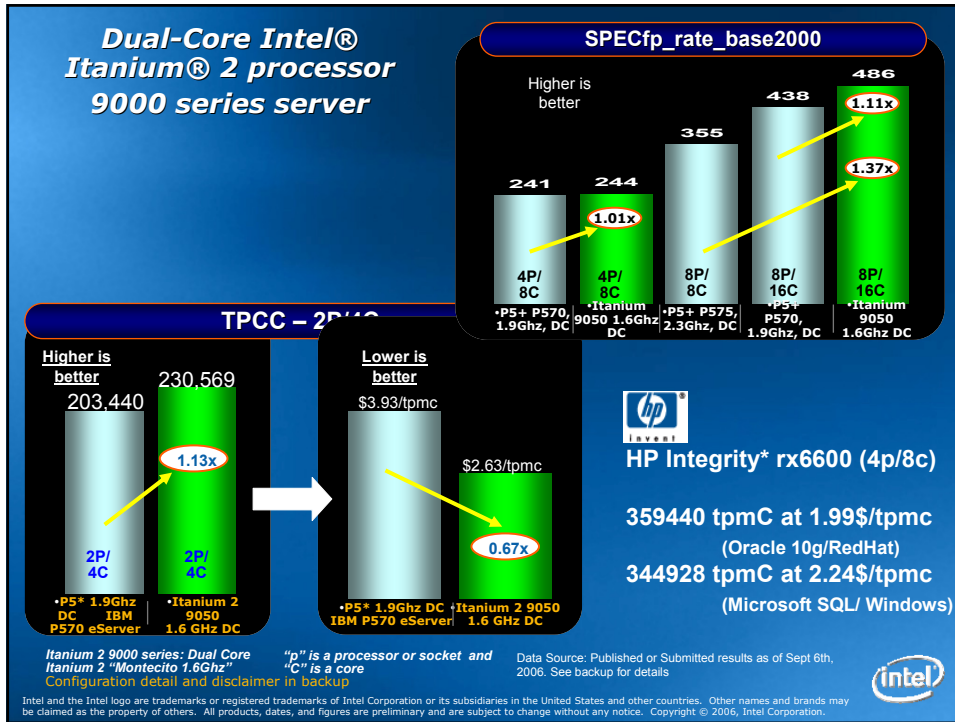
- Dual-Core
- Fast, 24MB on-die level 3 cache
- Intel® Hyper-Threading Technology
- Intel® Virtualization Technology
- Intel® Cache Safe Technology
- 104W Processor Power Envelope
- PCI-Express

Plus...

- Based on EPIC architecture
- Mainframe class reliability features

* Relative to Intel® Itanium® 2 Single-Core ("Madison") Processor






Itanium® 2 Reliability Advantages: Moving Beyond Legacy Limitations and Cost

Reliability Feature	IT Benefit	Intel® Itanium® 2 Platforms	RISC & Mainframe Platforms
Bad Data Containment	High System Availability	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Processor Cache Reliability	Data Error Protection	New <input checked="" type="checkbox"/> Intel® Cache Safe Technology	<input checked="" type="checkbox"/>
Intel Advanced Machine Check Architecture	Data Integrity	Enhanced <input checked="" type="checkbox"/> Soft Error Checking	<input type="checkbox"/>
Memory Mirroring & Hot Swap	Data Protection & On-line Repair	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Processor Lockstep	Computational Accuracy	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Memory Compartmentalization	Information Security	New <input checked="" type="checkbox"/>	<input type="checkbox"/>

A Better Business Foundation for Mission Critical Solutions

Current as of July, 2006. Source Intel Corp.
Learn more at <http://www.intel.com/business/bss/products/server/ras.pdf>



Itanium® Solutions Alliance 1 Year Anniversary

**\$10,000,000,000
ISA Investment**

**2x Itanium
Performance**

**> 100,000
End-User
Deployments**



ITANIUM® SOLUTIONS
ALLIANCE

**>10,000 Apps
2x YoY**

**100th ISA
ISV Member**

**2.5x Itanium
Perf/Watt**

Software Eco System continues to grow rapidly Example: Tranistive's QuickTransit®

- Solaris apps running unmodified on Intel/Linux
- Coexist with native apps
- User transparency
- Enables cross platform server consolidation
- Done in user space, no OS modification

Itanium® 2 Flexibility & TCO Advantage (Demo Setup at IDF 2007)

Seven SQL Server DB's

Virtual Environment #1

VMM

SMP Environment #1

Virtual Environment #2

VMM

SMP Environment #2

Itanium® Processor based Server

#1 Oracle IA64 Native

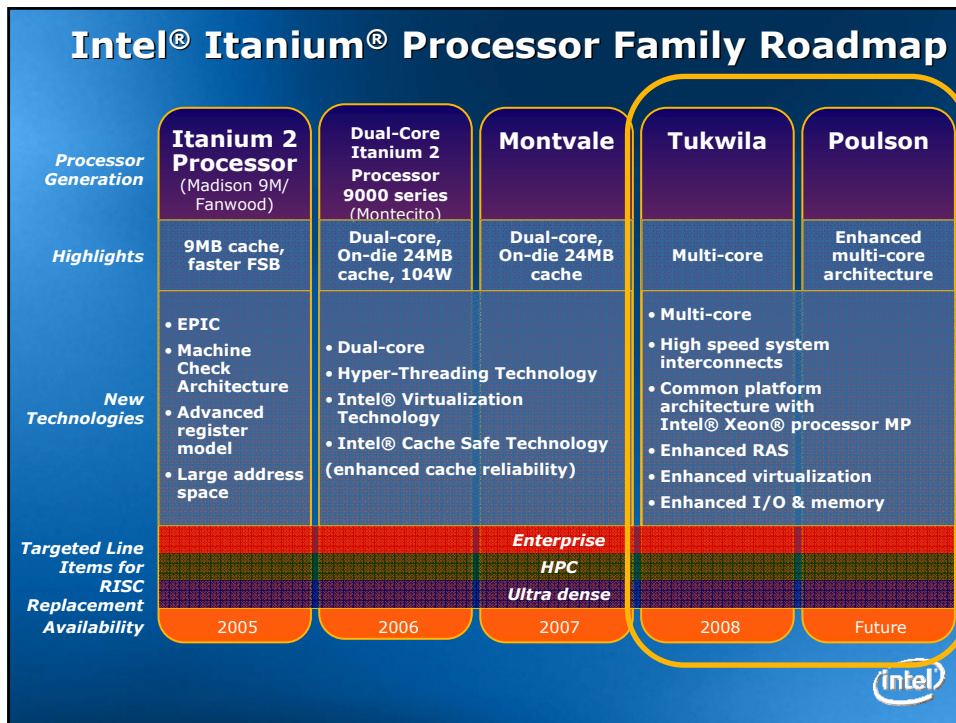
#2 Oracle Clients SPARC

#3 IBM DB2/MQ SPARC


#4 DB2 Clients SPARC

#5 Apache IA64 Native

Sharing Processor & I/O Resources




Summary: Itanium® advantages for IT



Unmatched Flexibility, Lower Cost Model
Enabled by broad vendor support and choice

Scalable Performance For Mission-Critical Applications
Double the performance and expanded enterprise capabilities along with improved energy efficiency; reducing costs and improving headroom

Optimized for Business Analytics
Improve time to critical information and real-time business decision making





Itanium® 2 9000 series Configuration Details Database performance

Common Disclaimer

- Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit <http://www.intel.com/performance/resources/limits.htm> or call (U.S.) 1-800-628-8686 or 1-916-356-3104.
- All dates and products specified are for planning purposes only and are subject to change without notice

TPCC-4P

- Performance Claim: Based on TPCC publication
 - **Source www.tpc.org:** Itanium® 2 processor results of 161,217 tpmC and \$3.94/tpmC on HP Integrity rx4640 using 4 Itanium® 2 processors 1.6GHz with 9MB L3 cache, (4 processors/4 cores/4 threads), 128GB memory, Oracle Database 10g Standard Edition, Red Hat Enterprise Linux AS 3, availability date 12/17/04. Itanium® 2 processor results of 344,928 tpmC and \$2.24/tpmC on HP Integrity using 4 Itanium® 2 dual core processors 1.6GHz with 24MB L3 cache (4 processors/8 cores/16 threads), 192GB memory, Microsoft Windows Server 2003 Enterprise Edition (64-bit), SQL Server 2005 Database, result published on 18th July 2006.



Itanium® 2 9000 series Configuration Details Database performance

TPCH-16P/1TB

- Performance Claim: Based on TPCB publication
 - Source www.tpc.org : Itanium® 2 processor, result of 14203 QphH@1000GB, US \$97.18 US per QphH@1000GB, on NEC Express5800/1320Xe (16 SMP), using Intel Itanium2 1.6GHz with 9MB L3 cache, (16 processors/16cores/16threads), 128GB memory, OS Microsoft Windows Server 2003, Datacenter Edition (64-bit), SQL Server 2005 result published on July'2005. Itanium® 2 processor, result of 33,488.1 QphH@1000GB, US \$27.00 US per QphH@1000GB, on HP rx8640, using Intel Itanium2 1.6GHz with 24MB L3 cache, (16 processors/32cores/64threads), 128GB memory, OS Microsoft Windows Server 2003, Datacenter Edition (64-bit), SQL Server 2005 result published on 18th July'2006.

TPCH-16P/3TB

- Performance Claim: Based on TPCB publication
 - Source www.tpc.org : Itanium® 2 processor, result of 26,246 QphH@3000GB, 44.58 US \$ per QphH@3000GB, on Unisys ES7000 Orion 440 Enterprise, using 32 Intel Itanium2 1.6GHz 6MB L3 cache, (32 processors/32 cores/32 threads), 256GB memory, Microsoft Windows Server 2003, Datacenter Edition for 64-bit Itanium-based Systems SP1. Microsoft SQL Server 2005 Enterprise Edition. Result published on Nov'2005. Itanium® 2 processor, result of 30,013 QphH@3000GB, 37.83 US \$ per QphH@3000GB, on Unisys ES7000/one Enterprise server, using Intel® Dual Core Itanium2™ 9040 1.6GHz w/ 18MB L3 Cache (16 processors/32 cores/64 threads), 256GB memory, Microsoft Windows Server 2003, Datacenter Edition for 64-bit Itanium-based Systems. Microsoft SQL Server 2005 Enterprise Itanium Edition SP1, result published on July 18th'2005.



Itanium® 2 9000 series Configuration Details World Record performance

SPECint rate base 2000

- Performance Claim: Based on SPEC publication
 - Source www.spec.org : Itanium® 2 processor results of 4230 on SGI Altix 4700 system, using 128 Itanium® 2 DC processors (128 processors, 256 Cores), 1.6GHz with 24MB L3 cache, 512GB memory, SGI ProPACK 4 SP3 OS, published on 18th July'2006. IBM Corporation has published highest result of 1063 on IBM eServer p5 595 (1900 MHz, 64 CPU), 64 cores, 32 chips, 2 cores/chip (SMT on), 256 GB memory and on OS AIX 5L V5.3, published on Oct'2004. Sun Microsystems has published a result of 1213 on Sun Fire E25K (72 processor), 144 cores, 72 chips, 2 cores/chip, UltraSPARC IV+, 1.5GHz, 288 GB memory, on Solaris 10 and result published on Dec'2005.

SPECfp rate base 2000

- Performance Claim: Based on SPEC publication
 - Source www.spec.org : Itanium® 2 processor results of 4937 on SGI Altix 4700 system, using 128 Itanium® 2 DC processors (128 processors, 256 Cores), 1.6GHz with 24MB L3 cache, 512GB memory, SGI ProPACK 4 SP3 OS, published on 18th July'2006. The next highest result on RISC is from IBM. IBM Corporation has published highest result of 1684 on IBM eServer p5 595 (1900 MHz, 64 CPU), 64 cores, 32 chips, 2 cores/chip (SMT on), 256 GB memory and on OS AIX 5L V5.3 ML_1, published on Nov'2004.

SPECOMPL2001

- Performance Claim: Based on SPEC publication
 - Source www.spec.org : Itanium® 2 processor results of 863,761 on SGI Altix 4700 system, using 64 Itanium® 2 DC processors (64 processors, 128 Cores), 1.6GHz with 24MB L3 cache, 512GB memory, SGI ProPACK 4 SP3 OS, published on 18th July'2006. The next highest result on RISC is from IBM. IBM Corporation has published highest result of 620741 on IBM eServer p5 595 (1900 MHz, 64 CPU), 64 cores, 32 chips, 128 threads, 2 cores/chip (SMT on), 256 GB memory and on OS AIX 5L V5.3, published on Jan'2005.

SPECJBB2005

- Performance Claim: Based on SPEC publication
 - Source www.spec.org : Itanium® 2 processor results of 3,772,246 BOPS, bops/JVM=58941 on SGI Altix 4700 system, using 128 Itanium® 2 DC processors (128 processors, 256 Cores), 1.6GHz with 24MB L3 cache, 512GB memory, SU5E Linux Enterprise server 9 SP3 OS, JVM BEA JRockit(R) 5.0 P26.4.0-10 (build P26.4.0-10-62459-1.5-0.06-20060529-z101-linux-i64), published on 18th July'2006. The next highest result on RISC is from Fujitsu. Fujitsu limited published a result of 1251024 BOPS, on Fujitsu PRIMEPOWER2500 using SPARC64 V 2.08Ghz, 128 chips, 128 cores, 512GB memory, Java HotSpot(TM) 32-Bit Server VM on Solaris, version 1.5.0_06, result published mar'2006.



Itanium® 2 9000 series Configuration Details

High End Platform Performance Comparison

SPECint rate base 2000

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 2367 on HP integrity Superdome system, using 64 Itanium® 2 DC processors (64 processors, 128 Cores), 1.6GHz with 24MB L3 cache, HT disabled, 512GB memory, OS HP-UX11i-TCOE B.11.23.0606, result submitted on 10th July 2006 and the data is under review. Sun Microsystems has published a result of 1213 on Sun Fire E25K (72 processor), 144 cores, 72 chips, 2 cores/chip, UltraSPARC IV+, 1.5Ghz, 288 GB memory, on Solaris 10 and result published on Dec'2005.

SPECfp rate base 2000

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 1861 on SGI Altix 4700 system, using 32 Itanium® 2 DC processors (32 processors, 64 Cores), 1.6GHz with 24MB L3 cache, 256GB memory, SGI ProPACK 4 SP3 OS, submitted as of 18th July 2006 and result is under review. IBM Corporation has published result of 1684 on IBM eServer p5 595 (1900 MHz, 64 CPU), 64 cores, 32 chips, 2 cores/chip (SMT on), 256 GB memory and on OS AIX 5L V5.3 ML_1, published on Nov'2004.

SPECJBB2005

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 1,887,226 BOPS, bops/JVM = 58976, 32 JVM's, on SGI Altix 4700 system, using 64 Itanium® 2 DC processors (64 processors, 128 Cores), 1.6GHz with 24MB L3 cache, 512GB memory, SUSE Linux Enterprise server 9 SP3 OS, JVM BEA JRockit(R) 5.0 P26 4.0-10 (build P26.4.0-10-62459-1.5_0_06-20060529-2101-linux-ia64), published on 18th July 2006. Sun Microsystems has published a result of 1,164,995 BOPS on Sun Fire E25K (72 processor), 144 cores, 72 chips, 2 cores/chip, UltraSPARC IV+, 1.5Ghz, 288 GB memory, 36 JVM instances, 32361 bops/JVM Java HotSpot(TM) 32-Bit Server VM on Solaris 10 1/06 (64-bit) and result published on Feb'2006.



Itanium® 2 9000 series Configuration Details

Mid-Range Platform Performance Comparison

SPECint rate base 2000

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 259 on HITACHI Blade Symphony BS1000 (Dual Core Itanium 2 processor 9050, 1.60GHz/24MB, FSB 400MHz), using 8 Itanium® 2 DC processors (8 processors, 16 Cores), 1.6GHz with 24MB L3 cache, 32GB memory, Red Hat Enterprise Linux AS 4 update 3, result submitted as of 18th July 2006 and the data is under review. Sun Microsystems has published a result of 156 on Sun Fire V890 (8 processor), 16 cores, 8 chips, 2 cores/chip, UltraSPARC IV+, 1.5Ghz, 64 GB memory, on Solaris 10 and result published on Oct'2005.

SPECfp rate base 2000

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 318 on HITACHI Blade Symphony BS1000 (Dual Core Itanium 2 processor 9050, 1.60GHz/24MB, FSB 400MHz), using 8 Itanium® 2 DC processors (8 processors, 16 Cores), 1.6GHz with 24MB L3 cache, 32GB memory, Red Hat Enterprise Linux AS 4 update 3, result published on 18th July 2006. Sun Microsystems has published a result of 137 on Sun Fire V890 (8 processor), 16 cores, 8 chips, 2 cores/chip, UltraSPARC IV, 1.35Ghz, 32 GB memory, on Solaris 10 and result published on Dec'2004.



Itanium® 2 9000 series Configuration Details

Entry Class Platform Performance Comparison

SPECint rate base 2000

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 134 on Bull Nova Scale 3045 (1600MHz), 8 cores, 4 chips, 2 cores/chip (Hyper-Threading Technology disabled) using 4 Itanium® 2 DC processors (4 processors, 8 Cores), 1.6GHz with 24MB L3 cache, 32GB memory, OS Bull Advanced Server 4 (linux kernel 2.6.12 (64k pages), glibc 2.3.4), Intel(R) Fortran Compiler for Linux 9.1 (Build 20060523) Intel(R) C++ Compiler for Linux 9.1 (Build 20060523) result published on June 2006. IBM Corporation has published result of 122 on IBM System p5 550Q (1500 MHz, 8 CPU), 8 cores, 4 chips, 2 cores/chip (SMT on), 64 GB memory and on OS AIX 5L V5.3, compilers XL C/C++ Enterprise Edition Version 8.0 for AIX XL Fortran Enterprise Edition Version 10.1 for AIX published on Sept'2005. Sun Microsystems has published a result of 79 on Sun Fire V490 (4 processor), 8 cores, 4 chips, 2 cores/chip, UltraSPARC IV+, 1.5Ghz, 32 GB memory, on Solaris 10, Sun Studio 11 and result published on Oct'2005.

SPECfp rate base 2000

- Performance Claim: Based on SPEC publication

Source www.spec.org : Itanium® 2 processor results of 186 on Bull Nova Scale 3045 (1600MHz), 8 cores, 4 chips, 2 cores/chip (Hyper-Threading Technology disabled) using 4 Itanium® 2 DC processors (4 processors, 8 Cores), 1.6GHz with 24MB L3 cache, 32GB memory, OS Bull Advanced Server 4 (linux kernel 2.6.12 (64k pages), glibc 2.3.4), Intel(R) Fortran Compiler for Linux 9.1 (Build 20060523) Intel(R) C++ Compiler for Linux 9.1 (Build 20060523) result published on June 2006. IBM Corporation has published result of 174 on IBM System p5 550Q (1500 MHz, 8 CPU), 8 cores, 4 chips, 2 cores/chip (SMT on), 64 GB memory and on OS AIX 5L V5.3, compilers XL C/C++ Enterprise Edition Version 8.0 for AIX XL Fortran Enterprise Edition Version 10.1 for AIX published on Sept'2005. Sun Microsystems has published a result of 75 on Sun Fire V490 (4 processor), 8 cores, 4 chips, 2 cores/chip, UltraSPARC IV, 1.35Ghz, 32 GB memory, on Solaris 10, Sun Studio 11 and result published on Dec'2004.



Itanium® 2 9000 series Configuration Details

Scaling and Energy Performance Comparison

SPECJBB2005 (Scaling performance)

- Performance Claim: Based on SPEC publication

• **Source www.spec.org:** Itanium® 2 processor results of 471,030 BOPS, bops/JVM = 58879, 8 JVM's, on SGI Altix 4700 system, using 16 Itanium® 2 DC processors (16 processors, 32 Cores), 1.6GHz with 24MB L3 cache, 64GB memory, SUSE Linux Enterprise server 9 SP3 OS, JVM BEA JRockit(R) 5.0 P26.4.0-10 (build P26.4.0-10-62459-1.5_0_06-20060529-2101- linux-ia64), published on 18th July 2006. Itanium® 2 processor results of 942,831 BOPS, bops/JVM = 58927, 16 JVM's, on SGI Altix 4700 system, using 32 Itanium® 2 DC processors (32 processors, 64 Cores), 1.6GHz with 24MB L3 cache, 128GB memory, SUSE Linux Enterprise server 9 SP3 OS, JVM BEA JRockit(R) 5.0 P26.4.0-10 (build P26.4.0-10-62459-1.5_0_06-20060529-2101- linux-ia64), published on 18th July 2006. Itanium® 2 processor results of 1887226 BOPS, bops/JVM = 58976, 32 JVM's, on SGI Altix 4700 system, using 64 Itanium® 2 DC processors (64 processors, 128 Cores), 1.6GHz with 24MB L3 cache, 256GB memory, SUSE Linux Enterprise server 9 SP3 OS, JVM BEA JRockit(R) 5.0 P26.4.0-10 (build P26.4.0-10-62459-1.5_0_06-20060529-2101- linux-ia64), published on 18th July 2006. Itanium® 2 processor results of 3772246 BOPS, bops/JVM = 58941, 64 JVM's, on SGI Altix 4700 system, using 128 Itanium® 2 DC processors (128 processors, 256 Cores), 1.6GHz with 24MB L3 cache, 512GB memory, SUSE Linux Enterprise server 9 SP3 OS, JVM BEA JRockit(R) 5.0 P26.4.0-10 (build P26.4.0-10-62459-1.5_0_06-20060529-2101- linux-ia64), published on 18th July 2006.

Performance/Watt on StarCD* 3.22

- Performance Claim: Based on Intel internal measurement

• **Source: Based on Intel internal measurement** Itanium® 2 processor measured system power 766 watts on Intel® SR870BN4 Server System, with Intel® Itanium® 2 Processor (processor) 1.6GHz with 9M L3 Cache, A2 stepping, 400 MHz FSB, 4P/4C, 16GB memory, Red Hat Enterprise Linux AS release 4, StarCD (Computational Fluid Dynamic modeling for manufacturing vertical), Workload Version: V3.22 (64bit). Itanium® 2 processor measured system power 660 watts on Hitachi* Cold Fusion-3e/4S-4U Server System (S6E4500 SDP) System, with Intel® Itanium® 2 Processor 1.6GHz with 24M L3 Cache, 533 MHz FSB, 4P/8C, 16x 1GB DDR2-667, Red Hat Enterprise Linux AS release 4, StarCD (Computational Fluid Dynamic modeling for manufacturing vertical), Workload Version: V3.22 (64bit). The relative performance upside measured on STAR-CD 3.22 (Engine wkld in jobs/day) was 2.23. This gives the performance/watt scaling of 2.6.



Itanium® 2 9000 series Configuration Details

HPC performance comparison

Linpack*

- Hitachi Alpha 2.0 533 MHz FSB quad-C2 (1.6 GHz, 24MB L3 cache) Montecito platform, using the Intel® Optimized LINPACK Benchmark 3.0.1, using 4 Itanium® 2 DC processors (4 processors, 8 Cores), 1.6GHz with 24MB L3 cache, 32GB memory, 64-bit Linux OS Red Hat Enterprise Linux AS release 4 (Nahant Update 3) Kernel 2.6.9-34.EL SMP. The result was compared to the IBM system,
- IBM System p5 550Q (1500 MHz, 8 CPU), 8 cores, 4 chips, 2 cores/chip (SMT on), published result at http://www-03.ibm.com/systems/p/hardware/whitepapers/p5_perf.pdf

Star-CD*

- SGI Altix 4700 system, using 32 Itanium® 2 DC processors (32 processors, 64 Cores), 1.6GHz with 24MB L3 cache, measured result on StarCD V3240/V3260, large A class models (21 million cells) and the results was compared to the IBM system IBM p5-575 (POWER5+) 2.2 GHz, 64 cores, Large pages + HPS (8), published at
- <http://www.cd-adapco.com/products/STAR-CD/performance/320/largeaclass.html>

MSC Nastran*

- SGI Altix 4700 system, using Itanium® 2 DC processors, 1.6GHz with 24MB L3 cache, single core performance measured result on MSC. Nastran V2005/V2006 results compared to IBM P5 575 1.9 GHz system result published at http://www.mscsoftware.com/support/prod%5Fsupport/nastran/performance/v05_sngl.cfm
The comparison was done by taking the Geomean of 8 workloads (lgqdf(108), xlemf(111), xltf(108), OX12 (111), xloop(200), xxafst(101), xxcmd(103), xxcmda(103 ACMS)
- IBM p5-575 (POWER5) 2.2 GHz, 64 cores, Large pages + HPS (8), published at <http://www.cd-adapco.com/products/STAR-CD/performance/320/largeaclass.html>

