

## Solution Brief

Dual-Core Intel® Itanium® 2 Processor 9000 Series



# Free Yourself from RISC

Reduce costs and complexity with the unbeatable flexibility and scalable performance of Dual-Core Itanium® 2-based servers.



With today's rising costs of data center build-out to meet the growing demands of business, IT departments need better alternatives to expensive, inflexible RISC-based infrastructures. Proprietary architectures are costly to acquire, maintain, and operate, with high-priced licensing fees, service agreements, and repair or replacement. The limited number of vendors supplying these systems means limited choices for the most effective business solutions that keep businesses agile and flexible enough to respond quickly to new opportunities as they arise. The high-cost "vendor lock-in," lack of choice, and inflexibility of RISC-based infrastructures can significantly degrade competitive advantage and slow business momentum.



# New Dual-Core Itanium® 2-based Servers

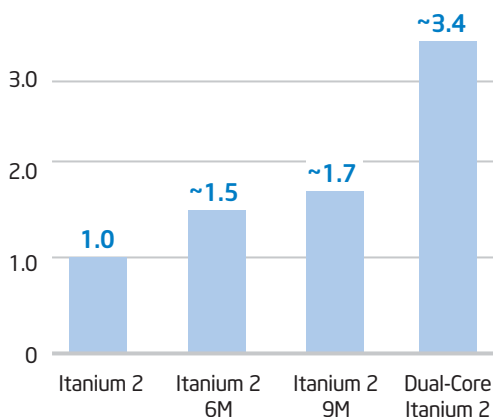
More reasons than ever to migrate your most demanding applications off RISC and legacy mainframe systems and onto cost-effective, standards-based Intel® architecture servers

The Dual-Core Intel® Itanium® 2 processor 9000<sup>a</sup> series delivers new levels of performance, reliability, and cost-effective scalability to handle your most data-intensive business and technical applications. With double the performance of yesterday's Intel Itanium 2 processors<sup>1</sup>; close to triple the amount of on-die L3 cache (more than 24 megabytes), Intel® Hyper-Threading Technology<sup>†</sup>; Intel® Virtualization Technology<sup>†</sup> for improved virtualization, Intel® Cache Safe Technology for increased availability, and up to 20 percent lower power consumption<sup>1</sup>; Dual-Core Intel Itanium 2 processors free you from the limitations of proprietary architectures while delivering the "always-on" service levels of mainframe-class systems.

Itanium® 2-based servers support more than 8,000 enterprise applications<sup>2</sup> and a larger choice of operating systems than any other 64-bit server on the market, providing greater flexibility and interoperability, lower costs, and better investment protection than proprietary RISC-based and legacy mainframe systems.

## Dual-Core Intel® Itanium® 2 Processors Offer Higher Performance

4S Online Transaction Processing (OLTP)<sup>†</sup>



<sup>†</sup> Source: Intel Corporation

**Figure 1.** The new Dual-Core Intel Itanium 2 processor adds another step in the ongoing capacity and performance scaling of Intel Itanium 2 architecture.

## Low-Cost, Low-Risk Legacy Migration

To provide a low-cost, low-risk path to moving legacy applications onto more cost-effective standards-based architecture, Intel is working with Transitive ([www.transitive.com](http://www.transitive.com)) and leading server vendors to offer Itanium-based systems that can run Sun Solaris\*-based applications and other applications compiled for RISC-based systems, with no code changes and near-native performance.

Intel is also working with Platform Solutions, Inc. ([www.platform-solutions.com](http://www.platform-solutions.com)), which has introduced Itanium-based servers that can run the IBM z/OS\* and OS/390\* operating systems, as well as Linux\*, UNIX\*, and Windows\*. This is yet another path to mainframe modernization and a way of preserving the value of legacy applications.

And where systems must run both 64-bit and 32-bit applications, the Dual-Core Intel Itanium 2 processor offers excellent support with its IA-32 Execution Layer Technology, making it easier to migrate the entire data center software stack over time to Intel Itanium 2 processor-based solutions, thereby increasing the performance of 32-bit code.

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"... HP Integrity Superdome\* servers with Intel® Itanium® 2 processors have brought good cost savings. The open-standards solution gives us a much lower cost of ownership than the expensive RISC-based legacy servers we had in place before. And we were able to easily migrate our applications from RISC-based architecture to Itanium® 2-based servers."

— Yuriy Katyanov, CIO, AVTOVAZ

## Mainframe-Class Reliability and Availability

Business-critical IT infrastructure demands the highest reliability and availability possible, and Intel has invested heavily in driving advanced reliability, availability, and serviceability (RAS) features previously found in high-end proprietary systems only. As a result, high reliability is no longer cost prohibitive and limited to proprietary platforms or legacy mainframe systems.

Intel Cache Safe Technology enables high-end systems to operate even in the event of errors in the L3 cache that can bring down systems. Intel Cache Safe Technology minimizes cache errors and helps ensure mainframe-caliber availability.

Dual-Core Itanium 2-based servers are highly reliable, manageable, and easily serviced, providing maximum uptime for business-critical applications.

Enhanced Machine Check Architecture (MCA) provides extensive error detection and correction capabilities, sophisticated platform error correction and recovery features, and a well-defined error

reporting and logging mechanism. Enhanced MCA continuously monitors critical functions across the entire platform, detecting bit-level errors and managing data corruption to ensure maximum system uptime.

The Dual-Core Intel Itanium 2 processor also includes a number of unique security features to support best-in-class data center security. These include faster data encryption, robust memory compartmentalization (via enhanced paging architecture), hardware authentication of firmware, and protected in-band configuration management.

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**“Our executive users don’t have time to wait for pages to load... The Intel®-based servers give us great performance and responsiveness—and the reliability is well beyond five nines.”**

— Michael E. Smith, Vice President, General Manager of Operations, Forbes.com

## Dual-Core Intel® Itanium® 2 Processor Reliability

Features	Functions	Benefits
Intel® Cache Safe Technology: automatic cache recovery	Allows processor and server to continue normal operation in case of cache error; automatically disables cache lines in the event of cache memory error	<ul style="list-style-type: none"> <li>Greater ability to survive cache errors</li> <li>Higher levels of computing uptime</li> </ul>
Enhanced Machine Check Architecture: extensive error detection and correction capabilities	Address and data path error correction; system-wide ECC protection; automatic error detection, logging, and correction	<ul style="list-style-type: none"> <li>Detect bit-level errors and manage data corruption, thereby providing outstanding reliability for maximum system uptime</li> </ul>
ECC memory with mirroring, redundancy, or Chipkill* capabilities; hot-plug platform components like supplies and disks; built-in hardware redundancy; enhanced platform-level manageability	Servers can detect, log, and correct errors and be configured with many levels of redundancy; server processor boards, memory, I/O, fans, power can be serviced while still up and running with hot-plug capabilities; servers can be managed remotely	<ul style="list-style-type: none"> <li>Servers are highly reliable, manageable, and easily serviced, providing maximum uptime for business-critical applications</li> </ul>

Platform capabilities shown represent example high-end enterprise server capabilities and can vary based on vendor-specific platform features and target applications.

## Scalable Performance and Cost Efficiency

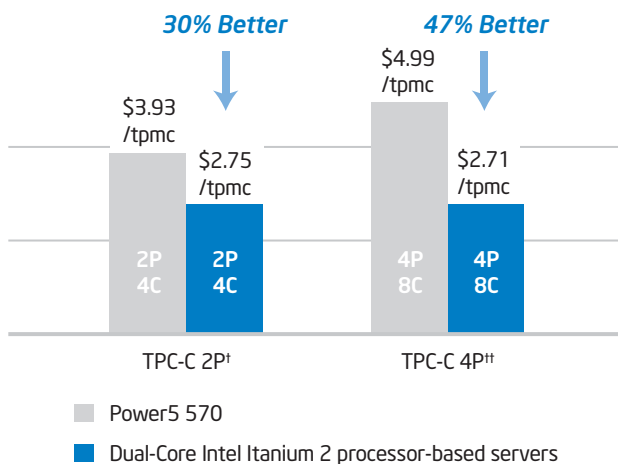
Dual-Core Itanium 2-based servers provide new levels of performance and cost-effective scalability for enterprise computing needs. With double the performance of yesterday's processor, up to 24 megabytes of low-latency on-die L3 cache, and Intel Hyper-Threading Technology, the new Dual-Core Intel Itanium 2 processor can power your most demanding applications at a far lower cost than proprietary offerings.

And despite its extraordinary power, the Dual-Core Intel Itanium 2 processor uses up to 20 percent less power<sup>1</sup> than yesterday's Intel Itanium 2 processor – enabling 2.5 times higher performance per watt and providing significant performance improvements while lowering energy requirements.

**“We have relied on high-performance and cost-effective Intel® Itanium® 2 processors to power our critical computational fluid dynamics (CFD) software simulations since 2003. We anticipate that the new Dual-Core Intel Itanium 2 processor will deliver performance gains of up to 35%... increasing our competitive edge on and off the racetrack.”**

— Elmar Huebner, Manager of IT, Toyota Motorsport

### Better Value for Business-Critical Applications



**Figure 2.** New Dual-Core Itanium 2-based systems are delivering substantially better price/performance than RISC-based systems. They are also helping organizations drive down their operational costs and improve the flexibility and scalability of their implementations.

From acquisition through management and maintenance, Dual-Core Itanium 2-based platforms can help lower total cost of ownership (TCO) and improve performance and flexibility, making it easier to justify transitioning to a more powerful and flexible architecture – and doing it now rather than later. Cost savings come from many factors, including:

- Higher performance enables server consolidation – fewer systems, lower costs.
- Greater range of optimized solutions at a lower cost than proprietary platforms reduces total investment.
- Lower power demand from a smaller system footprint and less heat generation reduces HVAC demand, easing the power-thermal challenge many IT departments face today.
- Lower cost of maintenance and management versus RISC systems.

**“We have optimized our dynamic reservoir engineering modeling software, Dynamo\*, to take advantage of the architectural features of the new Dual-Core Intel® Itanium® 2 processor. We have already achieved performance improvements of up to 50%... and in comparison to RISC-based systems, this platform provides far better performance and Total Cost of Ownership as well as the freedom to choose open source software. Because of these impressive results and benefits, we are rolling out Dual-Core Intel Itanium 2 processors across the globe to increase our speed and efficiency in forecasting gas and oil production in an economically, socially and environmentally sound way.”**

— Oskar Wols, Project Leader  
for the Dynamo project, Shell E&P

## Unbeatable Flexibility and Choice

Unlike proprietary architecture-based systems, Dual-Core Itanium 2-based server platforms are built on industry standards, offering you the greatest choice of operating systems, server and workstation management tools, and applications.

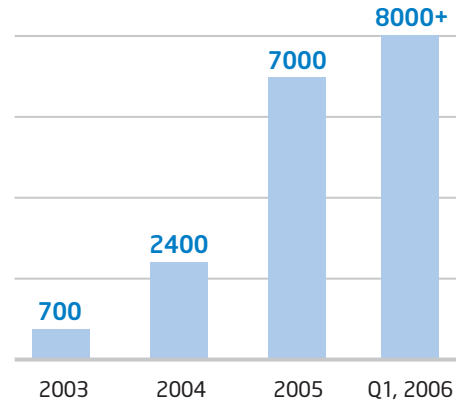
No other 64-bit servers on the market run a larger choice of operating systems, including Windows; Linux from SuSE, Red Hat, Red Flag, and other distributors; HP NonStop\*; OpenVMS\*; and HP-UX\*. There are also more than 8,000 applications from a global stable of industry-leading vendors such as Microsoft, BEA, IBM, Ansys, Gaussian, Symantec/Veritas, Oracle, SAP, and SAS.

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**“We realize that Intel® technology really pays off due to its flexibility to work with open source operating systems such as Linux\*. And the results are really positive.”**

— Alcino Lavrador, Executive Director,  
PT Inovação Brasil

## Rapid Growth in Itanium-Based Applications



Source: Intel Corporation<sup>2</sup>

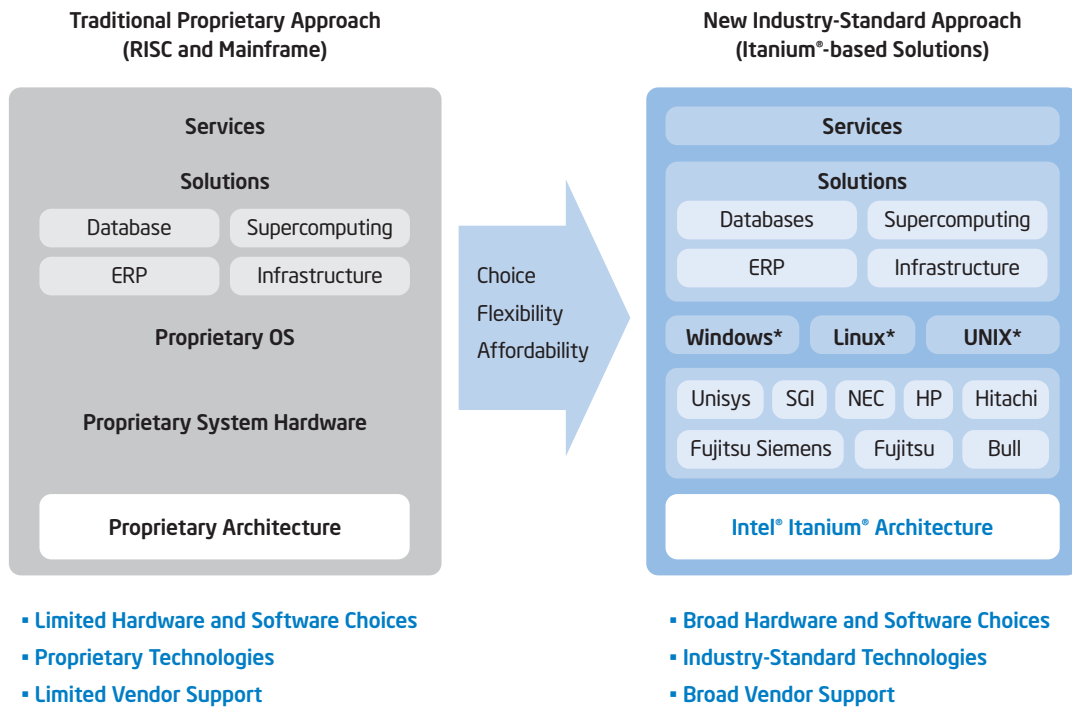
**Figure 3.** Application availability for Itanium-based systems has more than doubled in the past year, and porting efforts continue to accelerate.

## Global Adoption of Itanium 2-based Servers

It's no wonder that leading enterprise companies worldwide are transitioning from RISC-based and legacy mainframe systems to Itanium 2-based systems. Consider:

- More than 70 percent of the FORTUNE Global 100 companies are deploying Itanium 2-based solutions.<sup>3</sup>
- 9 of the top 10 automotive companies, 8 of the top 10 banking companies, 14 of the top 15 energy companies, 4 of the top 5 telecommunication companies, 2 of the top 3 insurance companies, 8 of the top 10 electronics manufacturing companies, and 4 of the top 5 healthcare companies are running Itanium 2-based server systems.<sup>3</sup>
- Industry-leading OEMs, ISVs, and OSVs worldwide have joined together to form the Itanium® Solutions Alliance, committing \$10 billion<sup>4</sup> to accelerate adoption and optimization of enterprise solutions based on the Itanium 2-based platform.

## Mission-Critical Computing



**Figure 4.** Itanium-based solutions offer an unprecedented level of choice and flexibility for business-critical computing, and can be instrumental in helping businesses get better total value from their IT investments.

Intel's open-standards approach enables a broad spectrum of developers to offer innovative new solutions for demanding computer environments. Standards-based platforms also allow easier adoption of new technologies and software, and the ability to quickly scale or consolidate to meet changes in demand. And with the ability to run multiple operating systems in different partitions with hard and soft partitioning, you gain the flexibility to dynamically align your IT infrastructure with business workloads.

**"We found database performance of Intel® Itanium® 2 processor-based servers to be the best for the Teamcenter application. It was 50 percent faster than comparably configured RISC-based servers at substantially lower cost."**

—Uma Maheshwaran, CTO, Tata Motors

Industry-leading OEMs, ISVs, and OSVs worldwide have joined together to form the Itanium Solutions Alliance ([www.itaniumsolutionsalliance.org](http://www.itaniumsolutionsalliance.org)). This global consortium of hardware and software vendors is dedicated to accelerating the development and availability of Itanium 2-based server solutions to enhance enterprise operations and competitiveness.

**"We were scouting for the best possible solution, and the HP servers\* based on the Intel® Itanium® 2 processor seemed to be the best in terms of the price versus performance ratio. RISC-based systems were very expensive for what we were looking for."**

—Girish Rao, Head, IT Solutions, Marico Limited

## Optimized for Business Analytics and Data-Intensive Applications

Gaining and maintaining business advantage today means achieving results faster and with greater cost efficiency than the competition. New Dual-Core Itanium 2-based servers handle vast amounts of data and users, high-volume transactions, and complex calculations, making them ideal for business intelligence, enterprise databases, data warehouses, ERP, SCM, and other data-intensive applications.

With dual-core processing, up to 24 megabytes of low-latency on-die L3 cache, Intel Hyper-Threading Technology, and Intel Virtualization Technology, the Dual-Core Intel Itanium 2 processor delivers double the performance of yesterday's processor and easily handles:

- Computationally intensive workloads
- High transaction volume
- Real-time reporting and analytics
- Sophisticated business intelligence applications
- Complex data-mining algorithms

Intel's standards-based Explicitly Parallel Instruction Computing (EPIC) technology, the cornerstone of the Intel® Itanium® architecture, provides the highest levels of compute parallelism, massive caches, high-precision floating-point engines, and advanced predication and speculation.

Intel Virtualization Technology, combined with advanced system capabilities, allows IT to create multiple virtual machines in a single server and securely run multiple operating systems and dozens of applications. And Intel Hyper-Threading Technology provides four times the number of application threads provided by earlier single-core implementations.

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**"The Itanium® 2-based server platform is easily able to support the requirements of high-performance logic processing, rules matching, application messaging, and database updates for every trade."**

— N. Muralidaran, Vice President, Information Technology, National Stock Exchange of India

## Invest in Your Business Momentum

Dual-Core Itanium 2-based servers give you a powerful alternative to the high cost and inflexibility of RISC-based and legacy mainframe systems – one that can lower TCO, modernize your infrastructure, and increase your company's agility and competitiveness.

Mainframe-class RAS features, double the performance, up to 20% lower power consumption, more powerful business analytics, unmatched flexibility, headroom for growth, simplified migration – no wonder more than 70% of the FORTUNE Global 100 companies have already made the move to Itanium 2-based systems.

**Get started today!**  
[www.intel.com/go/itanium](http://www.intel.com/go/itanium)



<sup>1</sup> Performance measured using OLTP (NT/SQL), SPECjbb2005, SPECintCPU, Linpack, and SAP-SD. Intel Internal Measurement (March 2006) comparing system configurations of Dual-Core Intel® Itanium® 2 processor 1.6 GHz with 24 MB L3 cache to Intel Itanium 2 processor 1.6 GHz with 9 MB L3 cache. Actual performance may vary. See <http://www.intel.com/performance/server/itanium2>.

<sup>2</sup> Intel internal data collected as of June 2006.

<sup>3</sup> Intel internal tracker, data as of June 2006, and Forbes Global 100 List dated June 2006.

<sup>4</sup> [www.itaniumsolutionalliance.org](http://www.itaniumsolutionalliance.org)

<sup>5</sup> Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See [www.intel.com/products/processor\\_number](http://www.intel.com/products/processor_number) for details.

<sup>6</sup> Hyper-Threading Technology (HT Technology) requires a computer system with an Intel® processor supporting HT Technology and an HT Technology enabled chipset, BIOS, and operating system. Performance will vary depending on the specific hardware and software you use. See [www.intel.com/products/ht/hyperthreading\\_more.htm](http://www.intel.com/products/ht/hyperthreading_more.htm) for more information including details on which processors support HT Technology.

<sup>7</sup> Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

<sup>8</sup> Source [www.tpc.org](http://www.tpc.org) IBM eServer p5 570 4P, POWER5 1.9GHz, 4P, (2 processors, 4 cores, 8 threads), 128 GB memory, Oracle Database 10g Enterprise Edition, IBM AIX 5L V5.3, result of 203,439 tpmC, \$3.93/tpmC, published on 10/17/05. Itanium 2 processor results of 200,829 tpmC and \$2.75/tpmC on HP Integrity rx4640 using 2 Itanium 2 processors 1.6GHz with 24MB L3 cache, (2 processors, 4 cores, 8 threads), 128GB memory, Oracle Database 10g Enterprise Edition, HP UX 11.1v2 64-Bit Base OS, was published on 03/21/06.

<sup>9</sup> Source [www.tpc.org](http://www.tpc.org) HP Integrity rx4640-8 4p c/s, on Intel DC Itanium2 Processor9050 1.6 Ghz, (4 processors, 8 cores, 16 threads), with 24M L3 Cache, 128 GB memory, Microsoft SQL Server 2005 Enterprise Itanium Ed, Microsoft WindowsServer 2003 Enterprise Edition SP1, published a result of 290,644 tpmC, \$/tpmC of 2.71 USD, on 3/27/2006. IBM eServer p5 570 8P, IBM POWER5 1.9 GHz, (4 processors, 8 cores, 16 threads), 256GB memory, IBM DB2 UDB 8.1, submitted a result of 429900 tpmC, 4.99 USD/tpmC on 8/31/2004.

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