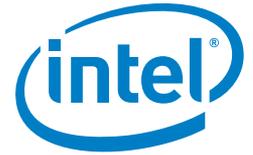


Product Brief

Intel® Itanium® Processor 9300 Series



Intel® Itanium® Processor 9300 Series



The Intel® Itanium® processor 9300 series delivers more than double the performance¹ of the previous-generation Intel® Itanium® processor 9100 series, along with greater scalability and an array of new reliability, availability and serviceability (RAS) features to support mission-critical computing environments. Servers based on these processors are built for today's most demanding workloads, such as database, business intelligence and enterprise resource planning (ERP) applications. They are also ideal for consolidating large numbers of applications to streamline the data center and reduce total costs.



More than Double the Performance

The Intel Itanium processor 9300 series provides dramatic increases in processing resources to deliver performance gains for a wide range of today's most demanding enterprise applications.

- **Twice as many processing cores:** Four high-performance cores help to increase throughput and reduce latency for multi-threaded applications and for multiple applications running simultaneously in consolidated application environments. Intel® Hyper-Threading Technology² further increases processing efficiency for many enterprise applications, by enabling each core to handle two active software threads.
- **Up to six times more memory bandwidth:**¹ With two integrated memory controllers and the new Intel® Scalable Memory Interconnect (SMI), more data can be delivered faster to the processing cores, which helps to increase core utilization and overall throughput for data-demanding applications.

- **Up to nine times more interconnect bandwidth:**¹

New Intel® QuickPath Interconnect Technology greatly accelerates core-to-core and core-to-I/O hub communications. This improves scalability in large multiprocessor system designs. It also provides greater capacity for I/O-intensive applications, such as enterprise databases and transactional applications with large numbers of simultaneous users. Intel QuickPath Interconnect Technology is being integrated into the Intel® Xeon® processor family, as well, which enables common chipset designs and will help fuel faster innovation for both architectures.

- **Up to eight times more physical memory capacity:**¹ The Intel Scalable Memory Interconnect and Intel® 7500 Scalable Memory Buffer support up to eight times more memory than the previous-generation processor using affordable DDR3 memory components. A single four-socket server can now be configured with a full terabyte of memory, and memory capacity scales readily with larger system designs.

Greater Scalability

The Intel Itanium processor 9300 series supports glueless system designs with up to eight processor sockets. This enables server manufacturers to build servers with lower chip counts and smaller board footprints. It also provides exceptionally fast processor-to-processor communications, which can speed performance for many applications.

Servers with more than eight sockets are built using vendor-designed node controllers to aggregate multiple, multi-socket Intel QuickPath Interconnect nodes into larger symmetric multi-processing (SMP) systems.³ This enables systems and clusters with hundreds or even thousands of processor cores for almost limitless scalability.

Advanced Reliability for Mission-Critical Environments

With today's massive data volumes, integrated computing environments and real-time business models, data integrity and uninterrupted operation are more important than ever. The Intel Itanium processor 9300 series builds on the RAS features of its predecessor, extending and enhancing the ability to support today's most mission-critical applications.⁴

- **Advanced Error Management:** Advanced protective mechanisms are incorporated on the processor die, in attached components and along the pathways that connect those components. An Advanced Machine Check Architecture enables coordinated error management across hardware, firmware and the operating system to greatly reduce the chance of a system crash or contaminated data.
- **Dynamic Hard Partitioning:** The Intel Itanium processor 9300 series supports system partitioning with full electrical isolation and dynamic allocation of resources among running partitions. This enables complete workload isolation for mission-critical applications, while providing the flexibility to scale resources as needed to deliver consistent and reliable performance. It also enables hardware maintenance without bringing down the system.
- **Superior Serviceability:** Processors, memory and I/O hubs can be added and replaced without downtime. Combined with the advanced error tracking provided in leading operating systems, this enables potential problems to be detected and repaired without interrupting business operations.

A Powerful and Flexible Platform for Virtualization and Consolidation

Servers based on the Intel Itanium processor 9300 series provide an ideal platform for data center consolidation. They are built to handle massive workloads and support multiple consolidation strategies, including:

- **Physical partitions for maximum workload isolation** (described previously).
- **OS partitions for high consolidation efficiency:** OS partitions enable multiple applications to operate under a single OS, while each appears to have a dedicated OS. This capability is provided by special manageability firmware and is therefore independent of the OS.
- **Virtual partitions for the most granular and dynamic control of resources:** The Intel Itanium processor 9300 series includes enhanced Intel® Virtualization Technology⁵ (Intel® VT-i2). This second-generation technology provides additional hardware assists for virtualization to further improve performance and capacity in virtualized environments, and to provide better and more flexible sharing of server and data center resources.

Enhanced Energy Efficiency

The Intel Itanium processor 9300 series includes integrated intelligence for optimizing performance per watt across diverse workloads.

- **Demand Based Switching** reduces energy consumption for light workloads by reducing frequency and voltage to the lowest state available that does not impair performance.
- **Intel® Turbo Boost Technology⁶** delivers higher performance for peak workloads, by increasing voltage and frequencies beyond rated values when this can be accomplished without exceeding the processor's thermal design power (TDP) envelope.

Together, these technologies help deliver optimal performance based on application requirements, while reducing energy consumption across a wide range of workloads.

Quick Guide to Features and Benefits

Business Advantages	Features/Function	Benefits
World-class reliability for uninterrupted business operations	Advanced Machine Check Architecture: Defines standards-based interfaces for integrated error handling across hardware, firmware and OS	Enables: – World-class availability and data integrity – Multi-vendor collaboration on next-generation solutions
	Support for flexible partitioning and dynamic resource management (including component hot add/remove/replace if supported by OS)	Supports flexible consolidation with high availability and consistent performance
	Intel® Cache Safe Technology: Automatically disables affected cache lines in the event of a cache error	Safeguards against persistent cache errors
	Advanced error detection/correction/containment across all major data pathways (includes soft error hardened latches, ECC memory with mirroring, and memory device failure correction capabilities, such as Double Device Data Correction)	Servers can detect, log, correct and otherwise respond to errors to increase uptime
Scalable, flexible systems for virtualizing and consolidating your data center	Silicon-level virtualization support: Intel® Virtualization Technology ⁵ (Intel® VT-i2)	Better workload isolation, reduced latency and less overhead when consolidating applications in virtualized environments
	Intel® QuickPath Interconnect Technology with 4.8 GT/s transfer rate and enhanced RAS	Scalable performance in large SMP configurations
	Up to eight-socket glueless systems	Scalable designs with lower chip counts and smaller board footprints
	Directory-based Cache Coherency	Improved cache efficiency and better scalability in large SMP configurations
High-end computing power for fast handling of complex transactions, massive amounts of data and large user populations	Four high-performance cores	Doubles the execution resources per processor versus the previous generation
	Intel® Hyper-Threading Technology² for executing up to two active software threads per core	Better efficiency for multiple workloads and multi-threaded software code
	Large addressable memory: Up to 1,024 terabytes	Able to hold vast datasets in main memory for faster processing
	Low-latency 6 MB L3 cache, 512 KB L2-I cache, and 256 KB L2-D cache (5-7 cycles) per core and single-cycle latency L1	Fast access to data and improved throughput for memory-intensive applications
	Dual integrated memory controllers with 34 GB/s peak bandwidth	
	Intel® Scalable Memory Interconnect supports up to eight times more memory than the previous generation processor using standard DDR3 components	Enables larger memory configurations using affordable DIMMs to support memory-intensive applications
	Intel® QuickPath Interconnect Technology with 4.8 GT/s peak bandwidth	High I/O bandwidth and low-latency for I/O-intensive applications
	1.73 GHz base frequency and up to 1.86 GHz for peak workloads with Intel® Turbo Boost Technology ⁶	Fast responses to complex calculations
High-precision floating-point architecture		
Energy efficiency for reducing data center costs	Enhanced Demand Based Switching dynamically optimizes voltage and frequency to reduce energy consumption during typical CPU utilization	Improved data center density with lower power and cooling costs
	Advanced CPU and memory thermal management	
Intel's industry-leading design and manufacturing capabilities	Higher value for your investment than proprietary RISC and mainframe offerings	Better value, faster innovation and stronger investment protection than competing solutions
	Strong Intel® Itanium® processor family roadmap	
	Common platform technologies and chipset with Intel® Xeon® processor family	

Intel® Itanium® Processor 9300 Series

Processor Number ⁷	Optimized For:	Cores/ Threads	L3 Cache (MB)	Base Frequency (GHz)	Boost Frequency (GHz) with Intel® Turbo Boost Technology ⁶
9350	Performance	4/8	24	1.73	1.86
9340	Price Performance		20	1.60	1.73
9330	Performance per Watt		20	1.46	1.60
9320	Value		16	1.33	1.46
9310	Low Power Consumption	2/4	10	1.60	N/A

All processors in the Intel® Itanium® processor 9300 series support: Intel® Hyper-Threading Technology, Intel® QuickPath Interconnect Technology (with a speed of 4.8 GT/s), four Intel® Scalable Memory Interconnect Channels, Intel® Virtualization Technology (Intel® VT-i2), and advanced reliability, availability and serviceability (RAS) features.

Platform Longevity to Protect Your Investment

Future Intel Itanium processors already in development are being designed to provide binary-compatibility and socket-compatibility with the Intel Itanium processor 9300 series. This will provide you with ongoing advances in performance, reliability, flexibility and value through simple component upgrades to the Intel Itanium processor 9300 series-based servers you purchase today, with no need to recompile existing software.

- **Next-Generation Intel Itanium processor (codename Poulson):** This processor will be based on a new ultra-parallel microarchitecture and will be manufactured on Intel's 32 nm process technology. It will include more cores, support more software threads, and run at a higher clock frequency. It will also include new RAS features and support a number of instruction-level advancements.
- **Future Intel Itanium processor (codename Kittson):** This processor is in definition today and will deliver another leap in performance and value.

www.intel.com/Itanium

¹ Based on Intel internal measurements.

² Hyper-Threading Technology requires a computer system with an Intel® processor supporting HT Technology and a HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See http://developer.intel.com/products/ht/Hyperthreading_more.htm for additional information.

³ Node controllers are an area in which server vendors can add unique value in their system designs (such as additional RAS and manageability features), so some may continue to design and integrate node controllers even in their 4-socket and 8-socket system designs.

⁴ Some features are supported fully in silicon and are performed automatically and transparently. Others require additional support from the firmware, platform or OS and may not be supported in all systems.

⁵ 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.

⁶ Intel® Turbo Boost Technology requires a platform with a processor with Intel Turbo Boost Technology capability. Intel Turbo Boost Technology performance varies depending on hardware, software and overall system configuration. Check with your platform manufacturer on whether your system delivers Intel Turbo Boost Technology. For more information, see <http://www.intel.com/technology/turboboost>.

⁷ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See http://www.intel.com/products/processor_number for details.

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.

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL® PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER, AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request. Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order. Copies of documents which have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or by visiting Intel's Web site at www.intel.com.

Copyright © 2010 Intel Corporation. All rights reserved. Intel, the Intel logo, Itanium, Xeon, and Itanium inside trademarks of Intel Corporation in the U.S. and other countries.

*Other names and brands may be claimed as the property of others.

