

64-Bit Computing with Windows Server 2003

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The Windows Server 2003 family supports two different 64-bit architectures.

The first 64-bit architecture is based on Explicitly Parallel Instruction Computing (EPIC) and supports the Intel Itanium processor family. [Windows Server 2003 for Itanium-based Systems](#) supports this architecture.

The second 64-bit architecture is based on 64-bit extensions to the x86 instruction set and supports both AMD64 and Intel Extended Memory 64 Technology (EM64T), found in the latest Xeon and Pentium processors. [Windows Server 2003 x64 Editions](#) support this architecture.

Windows Server 2003 for Itanium-based Systems was formally launched in April 2003. Windows Server 2003 x64 Editions will be generally available in April 2005.

Product Name	Architecture	Processors	Availability
Windows Server 2003 for Itanium-based Systems	EPIC	Itanium 2	Launched April 2003
Windows Server 2003 x64 Editions	x86-64	AMD Opteron; AMD Athlon 64; Intel 64-Bit Xeon; Intel Pentium with EM64T	April 2005

By supporting multiple 64-bit architectures, our customers have greater choice and flexibility on where to deploy Windows, and because all versions of Windows Server 2003 share the same familiar interface, our customers can leverage their existing Windows skills and expertise on more than one architecture.

This article explores the two different versions of Windows Server 2003 for 64-bit computing and outlines where customers are most likely to deploy each one.

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Windows Server 2003 for Itanium-based Systems

Windows Server 2003 for Itanium-based systems is intended primarily for large-scale, enterprise-class hardware running databases and line-of-business applications. This class of hardware not only delivers the highest levels of performance and scalability, it supports the RAS features (reliability, availability, and serviceability) that customers expect from this type of system. Large symmetric multiprocessor (SMP) systems of this kind are typically found in large enterprises, contain eight or more processors, and are devoted to mission-critical tasks. For this reason, Microsoft offers two versions of Windows for Itanium-based systems:

- [Windows Server 2003, Enterprise Edition for Itanium-based Systems](#)

- [Windows Server 2003, Datacenter Edition for Itanium-based Systems](#)

High-End Scalability and Performance

When the Itanium-based versions of Windows were launched in April 2003, the platform quickly set three consecutive world records for performance in the [TPC-C benchmark](#). Using SQL Server 2000, Enterprise Edition (64-bit) on the Windows Server on Itanium platform, these systems were the first to scale past 500,000, 600,000, and 700,000 transactions per minute (tpm-C).¹ While there are few customers, if any, who require scalability at this level in real-world deployments, these results were welcome news to customers who want to be sure that Windows provides more than enough headroom for their own environments.

In addition, Windows on Itanium currently holds the world record for performance among 32-way servers in the SAP R/3 Sales and Distribution Two-Tier benchmark. This system supports 5,210 concurrent users while maintaining response times of less than 1.93 seconds.² Like the example above, the result confirms that Windows on Itanium scales to meet the most demanding SAP deployments in the world.

Mission-Critical Reliability, Availability, and Serviceability

Windows on Itanium is designed for enterprise-class hardware that includes advanced RAS features for the most demanding environments. To maximize uptime, IT professionals deploy this class of hardware knowing that problems can be detected and corrected without having to reboot the server.

For example, Windows on Itanium supports Intel's Machine Check Architecture (MCA) found in Itanium processors. MCA provides a mechanism for hardware error events to be reported to the operating system, which can then take corrective action. In addition, MCA is able to predict failures based on patterns in past events. For more information on Windows support for MCA, visit [MCA Support in 64-Bit Windows](#) or [MCA Implementation Guide for 64-Bit Windows](#).

Other RAS features commonly found in this class of hardware can include redundant power supplies, the ability to swap cabinet blowers or I/O fans on the fly, and the ability to add memory without rebooting.

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Windows Server 2003 x64 Editions

Until recently, the vast majority of servers shipped worldwide were 32-bit servers based on the x86 instruction set. IT professionals have widely deployed 32-bit Windows on these servers for its ease of use, broad functionality, and exceptional value. Today, most new x86-based servers belong to a new class dubbed "x64." These servers carry the same familiar x86 instruction set but with added 64-bit functionality. This means that they can run existing 32-bit software, in addition to new 64-bit software.

Mainstream 64-Bit Computing

While Windows for Itanium is focused on meeting the needs of customers deploying large-scale databases and line-of-business applications, the x64 versions of Windows are designed for all workloads across a broad range of scenarios. For this reason, Microsoft offers three versions of Windows Server 2003 x64 Editions:

- [Windows Server 2003, Standard x64 Edition](#)
- [Windows Server 2003, Enterprise x64 Edition](#)
- [Windows Server 2003, Datacenter x64 Edition](#)

Maximum Flexibility

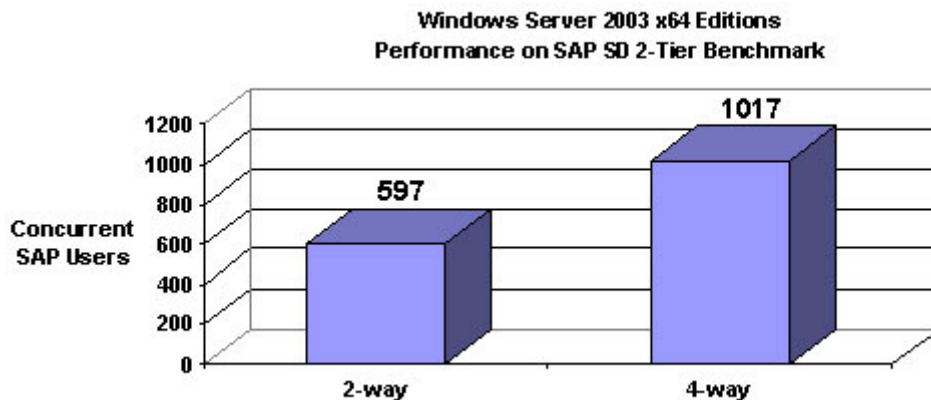
Windows Server 2003 x64 Editions are designed for the new class of industry-standard x64 hardware. By running both 32-bit and 64-bit software at peak performance, this new platform will extend our customers' current investment in Windows-based technology. x64-based systems give IT professionals the option of running 32-bit Windows today, while moving to 64-bit Windows at their own pace. Once they have deployed the x64 versions of Windows, they can combine 32-bit and 64-bit software on the same system. Providing multiple paths to 64-bit computing maximizes flexibility and eases migration to this new architecture, as illustrated below.

Windows Solution Stack Alternatives on x64 Hardware

	32-Bit Stack	Hybrid Stack	Pure 64-Bit Stack
Applications	32-bit	32-bit x64	x64
Windows Server	32-bit	x64	x64
Device Drivers	32-bit	x64	x64
Server Hardware	x64	x64	x64

Compatibility and Performance

Early benchmark results show that Windows Server 2003 x64 Editions live up to the promise of running both 32-bit and 64-bit software at high speed. Consider the February 2005 SAP Sales and Distribution Two-Tier benchmark results that combine x64 versions of Windows and SAP R/3 with the 32-bit version of SQL Server 2000 Service Pack 4. In these tests, Windows Server 2003 x64 Editions posted the fastest scores among all 2-way servers,³ and the second-fastest score among all 4-way servers.⁴



Over time, we believe our customers will increasingly choose the x64 versions of Windows instead of the 32-bit versions for the majority of their computing needs. With support for both x64 and Itanium processors, the 64-bit versions of Windows Server 2003 span the full range of needs for today's IT infrastructure. For more information, visit [64-Bit Computing Solutions](#).

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Target Workloads for Windows Server "Longhorn" on Itanium

One element of the Windows Server vision is to focus on simplifying the administration and management of every workload, which we call "the right server for the right job." This work will be seen across workloads running Windows Server "Longhorn". Windows Server "Longhorn" is designed to provide customers with agility

and a rock-solid server foundation to help increase operational efficiency and IT effectiveness.

To that end, Windows Server "Longhorn" customers using Itanium will have a superior deployment experience through streamlined administration and management around the database workload, and custom and business applications. Windows Server "Longhorn" for Itanium-based servers will be designed to offer customers the highest levels of reliability, availability and scalability on the Windows platform, and the leading alternate platform for RISC-based UNIX servers. To address these needs, Windows Server "Longhorn" for Itanium-based servers will be specifically designed for database workloads, and custom and line-of-business applications.

Windows Server "Longhorn" for Itanium will include all the necessary foundation technologies to support database applications, business applications and the ability for customers to design, deploy and manage custom applications. As with Windows Server 2003, Windows Server "Longhorn" for Itanium will continue to support client-side functionality for administration, management and server utilities.

¹ Source: Transaction Processing Performance Council (TPC) at <http://www.tpc.org>. The TPC defines transaction processing and database benchmarks and delivers trusted results to the industry.

² Source: SAP Standard Application Benchmarks at <http://www.sap.com/benchmark>.

³ Source: <http://www.sap.com/benchmark>. 2-way result: 597 concurrent SAP SD users, HP ProLiant ML370 G4 Model HPS, 2-way SMP, Intel XEON (3.6 GHz), L1 Execution Trace Cache, 2 MB L2 cache, 16 GB main memory.

⁴ Source: <http://www.sap.com/benchmark>. 4-way result: 1,017 concurrent SAP SD users, HP ProLiant DL585, 4-way SMP, AMD Opteron processor Model 852 (2.6 GHz), 128 KB L1 cache, 1 MB L2 cache, 16 GB main memory.

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