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# Intel Architecture Technology

## *Information Brief*

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### **Worth remembering**

No matter what your performance needs may be, IBM has the PC, IntelliStation® professional workstation, ThinkPad® notebook or Netfinity® server to meet your needs and a complete range of Intel® processors from which to choose.

- Intel's Pentium® III Xeon™<sup>1</sup> and Pentium II Xeon processors are specifically designed to meet the demanding scalability and reliability requirements of mainstream and high-end Netfinity servers and IntelliStation workstations.
- The new, high-end Pentium III processor features internal clock speeds of up to 600MHz<sup>2</sup>, a 100MHz front side bus, improved security and manageability—and 70 new instructions for enhanced application performance.
- The Pentium II processor features clock speeds of up to 450MHz with excellent performance for today's office suites, graphics and games.
- The Mobile Pentium II processor is available on select ThinkPad notebooks with clock speeds of 233, 266, 300, 333, 366 and 400MHz and provides real performance gains over previous Pentium processors in a notebook environment.
- The Intel Celeron™ processor with clock speeds of up to 500MHz and 128KB L2 cache for desktop PCs and the Intel Mobile Celeron processor at 400MHz and 128KB L2 cache are designed to meet the core needs and affordability requirements common to many new or entry PC users. The 466MHz Celeron processor features Intel's new 810 chipset that offers new capabilities to cost-sensitive users, including improved multimedia functions.

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### **Pentium III Xeon and Pentium II Xeon processors**

Building on the architecture of the Pentium II Xeon processor, the Pentium III Xeon processor—now available with speeds up to 550MHz for workstations and servers—offers the kind of superior performance, manageability and mission-critical reliability that are demanded by customers using IBM Netfinity servers and IntelliStation workstations.

The Pentium III Xeon and Pentium II Xeon processors are designed specifically to support the needs of single- and multithreaded workstation applications. Such applications include scientific and technical packages, such as Mechanical Computer-Aided Design (MCAD), finite element analysis, Electronic Design Automation (EDA), scientific modeling and analysis, software engineering, graphics and imaging and other computation-intensive activities. To support the large application sizes, data sets and I/O demands of these applications, workstations are built with high-performance system buses for processor-to-memory connectivity, PCI buses for high-speed peripheral interconnection, SCSI buses to support high-performance disks and hardware to accelerate graphics applications.

The Pentium III Xeon and Pentium II Xeon processors offer a stable and reliable architecture for servers that run UNIX®, Windows NT® and Linux operating systems. The Pentium III Xeon and Pentium II Xeon processors provide the foundation for a new class of balanced, high-performance servers with enterprise-class reliability, scalability and availability. The latest Pentium III Xeon processor features include a full-speed error-correcting L2 cache with size options ranging from 512KB to 2MB. These systems feature a robust architecture to balance the memory, I/O and processor requirements for the most demanding environments.

The features of the Pentium III Xeon and Pentium II Xeon processors and supporting AGP chipsets and PCI chipsets eliminate the key roadblocks that previously limited performance on the most demanding IntelliStation workstation or Netfinity server. The new 550MHz processor core speed executes instructions quickly, while dynamic execution and smooth multiprocessing allow work to be performed in parallel. Intel's full-speed L2 cache, large cache sizes, and 100MHz system bus reduce memory latency, facilitating the movement of data through the processor and I/O devices. Both the 440GX AGP chipset and the 450NX PCI chipset provide support for high-performance I/O. Graphics performance is enhanced with the 2x Accelerated Graphics Port (AGP), the 100MHz system bus, and the tuned interfaces of the 440GX AGP chipset. The 450NX PCI chipset supports a 64-bit PCI bus.

With the introduction of the Pentium III Xeon processor, workstation and server applications will now benefit from Streaming SIMD Extensions. Workstation applications will gain from the new media instructions and SIMD-floating point for enhanced imaging, as well as computation-intensive calculations. Server applications will benefit from the memory streaming architecture, or cacheability control instructions, that improve memory latency. Streaming SIMD Extensions will improve TCP/IP Internet throughput for Web servers and cache-intensive applications, such as database or enterprise resource planning applications.

The Pentium III Xeon and Pentium II Xeon processors were specifically designed for servers and workstations. Netfinity servers, featuring the Xeon processor, offer high-end platform benefits, incorporating Internet and data center class features for business-critical computing. These servers, according to Intel, have attracted a broad range of hardware, operating systems and applications and are the "next generation of standard high-volume server solutions." They provide a common computing architecture from the desktop to the data center, enabling business agility. IBM Netfinity servers using Pentium III Xeon and Pentium II Xeon processors are capable of moving your legacy applications forward and pave the road to IA64. IBM is committed to providing systems using Intel processors consistent with the Intel processor road map.

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## **Pentium III and Pentium II processors**

The Pentium III processor combines the Pentium II processor technology with new instructions and new security and manageability. Both the Intel Pentium III and Pentium II processors build on P6 microarchitecture, while adding the multimedia enhancement benefits of MMX™ technology.

With processor clock speeds of up to 550MHz, main memory running at 100MHz and L2 cache speeds of up to half the processor speed, the Pentium III and Pentium II processors employ advanced Intel technology. These processors use dynamic execution techniques in conjunction with two 16KB Level 1 caches—one each for instructions and data—as well as an inline 512KB Level 2 cache. The Pentium III and Pentium II processors are optimized for 32-bit integer, multimedia and floating-point 32-bit applications running 32-bit operating systems, and readily

scale up to two processors for symmetric multiprocessing (SMP). Both the Pentium III and Pentium II processors are well-suited for home, business, workstation and server environments.

The Pentium III and Pentium II processors are packaged on Intel's Single Edge Contact Cartridge (SECC). The cartridge is essentially a daughter card, comprising the Pentium III or Pentium II processor core, a unified (code and data) non-blocking 512KB L2 cache, and a dedicated 64-bit bus to facilitate higher data transfer rates between the processor and the L2 cache. The Dual Independent Bus (DIB) architecture interface to the L2 cache scales with processor speeds. This processor design offers high-volume availability, improved handling protection, high reliability and a common form factor and socket for future higher performance processors.

Performance of Pentium III and Pentium II processor-based systems is enhanced by several supporting technologies including the DIB architecture, and Intel's 440BX AGP chipset. The DIB architecture was developed to increase processor bus bandwidth. The DIB scheme enables the processor to access data from either of its buses—the L2 cache bus and the processor-to-main-memory bus—simultaneously and in parallel. This overcomes the limitations of the singular, sequential techniques of a single bus system. The DIB architecture allows the L2 cache to run at half the processor speed (more than three times faster than the L2 cache of Pentium processors) and the main memory of Pentium III and high-end Pentium II processors to run at 100MHz.

The 440BX AGP chipset supports the 2X Accelerated Graphics Port, which bypasses the heavily used PCI bus, providing a direct link between graphics processor, the system chipset and system memory. AGP can pipeline up to 533MBps of graphic information to the screen, compared to the maximum of 133MBps for the PCI bus. That's additional bandwidth to handle the growing demands of visual applications such as full-motion video, imaging and real-time 3D display.

One benefit of the Pentium III processor over the Pentium II is the Streaming SIMD Extensions. Streaming SIMD Extensions consist of 70 new instructions for floating point, multimedia and memory streaming. The Pentium III processor also features Single Instruction Multiple Data (SIMD) capabilities for floating point calculations. These new capabilities improve productivity and data comprehension by enabling users to utilize rich, new applications and user interfaces. Some of the technologies that benefit from the Streaming SIMD Extensions include advanced imaging, 3D, streaming audio and video and speech recognition applications. Hundreds of applications and Web sites are being enhanced specifically for the Pentium III processor.

The Pentium III also contains the Intel Processor Serial Number, the first of Intel's planned building blocks for PC security. The Processor Serial Number is a unique and persistent identifier that allows stronger forms of system and user identification. Applications for this feature include managing access to new Internet content and services, electronic document interchange, asset management, remote system load and configuration, fire wall security, virus protection, help desk and error reporting and data backup protection. This feature will be delivered in the DISABLED mode on IBM systems, and the user will have the option to enable the feature if they wish.

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## **Mobile Pentium II processors**

The Mobile Pentium II processor builds on P6 microarchitecture while adding the media-enhancement benefits of MMX technology. The Mobile Pentium II processors help high-performance notebooks to take advantage of new and emerging technologies such as

DVD, high-speed wireless communication, robust multimedia, cutting-edge manageability and next-generation operating systems.

Available on select ThinkPad notebooks, the Mobile Pentium II processor is available in clock speeds of 233, 266, 300, 333, 366 and 400MHz with 256KB L2 cache onboard or 512KB L2 cache, in form factors designed to exploit the size and weight limitations of mobile systems while improving the power of the processors through a breakthrough manufacturing process. The Mobile Pentium II processor has DIB architecture as well, which offers simultaneous parallel access to data.

Mobile Pentium II processor-based notebooks support Intel's Wired for Management (WfM) initiative, focused on enhancing the control and support of mobile systems. WfM-compliant systems can take advantage of the latest advanced system management technologies. Mobile Pentium II processors can provide real performance gains over previous Pentium processors in an enhanced notebook environment.

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## **Intel Celeron processors**

The Intel Celeron processor provides a base level of functionality to meet the core needs and affordability requirements common to new or entry users. The Celeron processor is available in speeds up to 466MHz with 128KB L2 cache. ThinkPad Model 390E features the Intel Mobile Celeron processor at 400MHz with 128KB onboard cache.

Celeron systems also offer a complete package of the latest technologies, including support for AGP graphics, Ultra ATA hard disk drives, SDRAM and ACPI. IBM Celeron products feature a BX chipset, support 2 DIMMS, run a 66MHz front side bus and have no ECC memory. Based on the same P6 microarchitecture of today's Pentium II processors, the Celeron processor provides an affordable and balanced platform to run standard business applications.<sup>3</sup>

### ***New Intel 810 chipset***

The 500MHz Celeron processor now features Intel's new 810 chipset with improved multimedia functions for entry-level customers. The Intel 810 chipset's smart graphics integration delivers all the benefits of traditional AGP dynamic memory allocation while supporting implementations with or without (for greater cost savings) dedicated frame buffer memory. In addition to optimizing 3D performance, the graphics technology deployed in the 810 chipset enables TV-out, digital flat-panel display and soft DVD acceleration. The 810 chipset-based systems also deliver Ultra ATA 66 drive interface to enable new levels of disk transfer rates.

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## **IBM offers the latest Intel processor technology**

No matter what your performance needs may be, IBM has the PC, IntelliStation professional workstation, ThinkPad notebook or IBM Netfinity server system to meet your needs, and a complete range of Intel processors from which to choose. IBM offers IBM PC models that incorporate Celeron, Pentium II and Pentium III processors with speeds of up to 600MHz. The IntelliStation series features uni- and dual-processor models, with Pentium II, Pentium III, Pentium II Xeon and Pentium III Xeon processors. The IBM Netfinity family of products offers systems with a choice of Pentium II, Pentium III, Pentium II Xeon and Pentium III Xeon processors with clock speeds available up to 550MHz—with either 2MB, 1MB or 512KB

integrated L2 cache. Select ThinkPad notebooks are available with Mobile Pentium II or Mobile Celeron processors with L2 cache.

You can be confident that IBM will continue to provide innovative products with the latest, most-advanced Intel processors as they become available.

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## ***For more information***

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For information via the World Wide Web

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**1 800 426-7255, ext. 4753**  
**1 919 517-0001**  
**1 800 IBM-3395**  
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In Canada

For product and dealer location information

To access the IBM Personal Systems Group Bulletin Board

For product information sent directly to your fax machine

IBM ThinkPad Information Directory

PC Desktop Product Guide

PC Server Solutions Product Guide

Netfinity Product Guide

**Doc #11078**

**Doc #12710**

**Doc #12735**

**Doc #12739**

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<sup>1</sup> See [www.intel.com](http://www.intel.com) for further details on Xeon.

<sup>2</sup> MHz only measures microprocessor internal clock speed not application performance. Many factors affect application performance.

<sup>3</sup> More information on Celeron performance benchmarks can be found at [www.intel.com/procs/perf/basicpc/index.htm](http://www.intel.com/procs/perf/basicpc/index.htm).

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