PRIMER

July 1996

Pentium® Pro Processor

Answers to Commonly Asked Questions

Why do I need a Pentium® Pro processor-based system?

The Pentium® Pro processor is the flagship of a new generation of Intel microprocessors. It offers outstanding performance, manageability and reliability for users who are running Windows* NT, Unix* or other 32-bit operating systems and the latest 32-bit applications. If your organization is migrating to Windows* NT and/or 32-bit applications under Windows* 95, Pentium Pro processor-based systems are an excellent investment.

What Software runs best on a Pentium Pro processor?

The Pentium Pro processor is designed to excel in pure 32-bit environments, such as Windows* NT and Unix*, while offering 16-bit performance comparable to that of a high-speed Pentium processor. The Pentium Pro processor offers excellent performance in mixed envrironments, as well, such as 16-bit applications running on Windows* NT or 32-bit applications on Windows* 95. For 16-bit applications on Windows* 95, however, the Pentium Pro processor performs similarly to a high-speed Pentium® processor.

Why did Intel optimize the Pentium Pro processor for 32-bit performance?

Today, 32-bit software is a growing part of the overall market and dominates at the high-end. Most standard business productivity applications are now available in 32-bit versions. Migration to 32-bit software and operating systems such as Windows* NT is a major trend in corporations and other large organizations, and this trend is expected to grow. The Pentium Pro processor offers unsurpassed performance for standard 32-bit software, offering twice the performance of a Pentium processor-133MHz when running 32-bit business appplications on Windows* NT (based on a Pentium Pro processsor-200MHz). The performance of the Pentium Pro processor on 16-bit software runnning under Windows* 95 or Windows* 3.1 is similar to that of a fast Pentium processor. Those purchasers who do not plan to upgrade to 32-bit environments and applications during the life of their systems may find that a high-speed Pentium processor offers the best value.

Why does Windows* 95 not show the same performance as Windows* NT when running on the Pentium® Pro processor?

The first release of Windows* 95 contains a signigicant amount of 16-bit code in the graphics subsystem. This causes operations on the Pentium Pro processor to be serialized instead of taking advantage of the Dynamic Execution architecture. Nevertheless, Pentium Pro processors are up to 30 percent faster than the fastest Pentium processor for 32-bit applications on Windows* 95. Windows* NT, however, is a pure, 32-bit operating system. It has been architected and written as a multithreaded operating system. The architecture of Windows* NT is very complementary to the highly parallelized Dynamic Execution architecture of the Pentium Pro processor. Pentium Pro processor-based systems will deliver the best performance under Windows* NT and other 32-bit environments.

What is Dynamic Execution?

The term “Dynamic Execution” describes a key element of the Pentium Pro architecture. Dynamic Execution enables the processor to execute more instructions on parallel, so that tasks are completed more quickly. This technology innovation is comprised of three main elements:

- Multiple branch prediction, to predict the flow of the program through several branches;
- Dataflow analysis, which schedules instructions to be executed when ready, independent of their order in the original program; and
- Speculative execution, which increases the rate of execution by looking ahead of the program counter and executing instructions that are likely to be needed.

The Pentium® Pro processor looks different than other chips. Will it fit into a Pentium® processor socket?

No, the Pentium® Pro processor bus is quite different from a Pentium® processor bus so it is not designed to be pin compatible. The component bus of a Pentium processor is designed to interface to an external L2 cache and includes features to optimize CPU-to-cache data transfers. In contrast, the first Pentium Pro processor includes a 256KB L2 cache in the same package and the CPU communicates with its L2 cache using a private internal bus. The component bus of a Pentium Pro processor is designed to interface to a cache coherent memory bus and includes features to optimize cache-to-memory data transfers.

What are the advantages of an in-package L2 cache?

Having the L2 cache in the package not only simplifies system design and saves space, it also means the CPU core can communicate with the L2 cache at full speed. Additionally, the cache is non-blocking which means that transactions on the Pentium Pro processor bus don't stall the processor or block subsequent bus transactions. For example, when a cache miss occurs, the Pentium Pro processor continues to process other instructions while initiating a bus transaction to satisfy the cache miss; these instructions could generate additional cache misses which could cause more bus transactions. The Pentium Pro processor can maintain up to four of these outstanding transactions.

Will multi-processing be easier with the Pentium Pro processor?

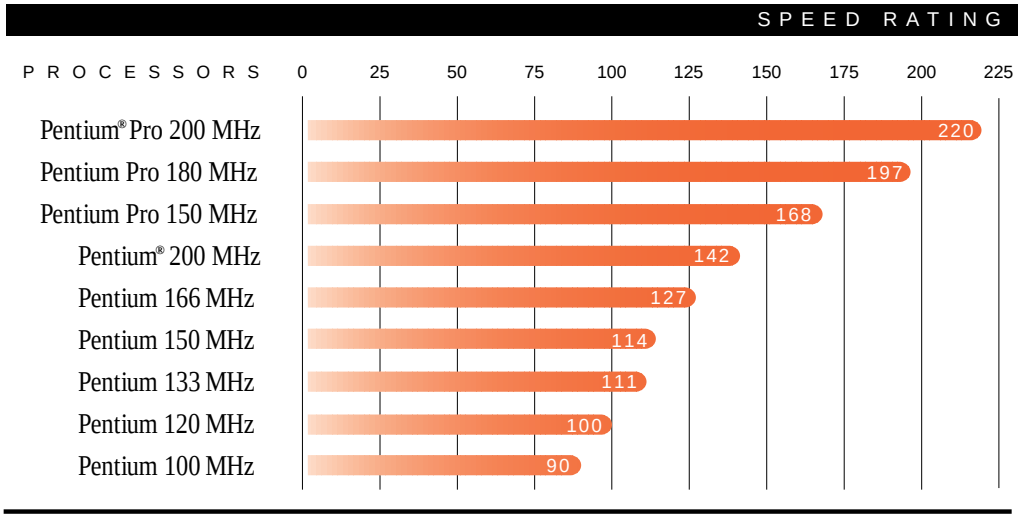
The Pentium Pro processor bus was designed to support multiple Pentium Pro processors connected in parallel. The Pentium Pro processor component bus is a symmetric multiprocessing bus and includes full support for the MESI protocol. "Glueless" MP Pentium Pro processor system designs are supported; that is, no additional system logic is required for multi-processing since the Pentium Pro processor includes all the logic required to directly support the interconnection of up to four Pentium Pro processors. This means that it's very easy — and cost effective — for system designers to include multiple Pentium Pro processors, essentially by just providing sockets for the additional processors.

Is the Pentium Pro processor a 64-bit processor? Does it support 64-bit integer instructions?

No. Like all Intel processors since the Intel386™ processor, the Pentium Pro processor is a true 32-bit processor. The general purpose registers are the same as on previous generations of Intel Architecture processors and the instruction set is supported with only one new instruction being introduced. However, there are a variety of wider datapaths both inside and outside the chip. One visible feature that is sometimes misinterpreted is that the Pentium Pro processor, like the Pentium processor, has an external 64-bit bus in order to communicate more efficiently with the system memory. This wider external datapath increases bandwidth between the Pentium Pro processor and the system, but doesn't make it a 64-bit machine.

What is the iCOMP® Index 2.0 for the Pentium® Pro Processor?

iCOMP® Index 2.0 is an easy-to-understand rating reflecting the relative performance of Intel microprocessors. iCOMP Index ratings are normalized to the Pentium® Processor running at 120MHz which has an iCOMP Index 2.0 rating of 100.



Differences in hardware and software configuration will affect actual performance. iCOMP® Index 2.0 reflects 32-bit applications and benchmarks. It combines 5 benchmarks: CPUmark32*, Norton SI-32*, SPECint95*, SPECfp95*, and Intel Media Benchmark. Each processor's rating is calculated at the time the processor is introduced. Ratings for processors introduced before iCOMP Index 2.0, were calculated upon version 2.0's release. For more information about iCOMP Index 2.0, including a description of the systems used to calculate ratings, contact Intel at 1-800-628-8686.

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242801-004

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