platform solutions
on-line news for the hardware developer

Issue 8, April 22, 1998

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On behalf of all of us at Platform Solutions, welcome to the future of the PC platform!

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Feature

Intel® Architecture for Everyone

By Paul Otellini
Executive Vice President and General Manager
Intel Architecture Business Group, Intel Corporation

Intel has recently demonstrated its commitment to meeting customer demand for its products by introducing three different versions of its latest 0.25 micron, P6 microarchitecture based, processor technology. A fourth version is also waiting in the wings! Each product is designed specifically for one of the growing segments of the PC industry. A new 350- or 400-MHz Pentium® II processor with a 100MHz system bus supports professional desktop users in business, PC enthusiasts in the home, and entry-level servers and workstations. A specially packaged Pentium II processor brings 233- and 266-MHz computing power into the mobile segment. And finally, the 266-MHz Intel® Celeron™ processor supports the basic PC, with a new Intel® Architecture brand for both home and business users.

Many people have asked, “what will I possibly need all this performance for?” I remind them of similar questions when Intel first introduced the i386™ processor, the Intel486™ processor and the Pentium II processor. Processing power is about adding capability and masking complexity. New applications are enabled with the additional performance of these P6 microarchitecture-based platforms—things not possible before, and some applications not even thought of yet, will become available to more and more users. A recent trend in business desktops, for example, is “constant computing.”

Fuelled by the massive data resources and pervasive communication capability of the World Wide Web, a user can write agent scripts that search for precise information, or monitor real-world variables such as the weather or stock market, or propagate messages and information to other offices. These scripts run in the background while the user is creating presentations, dictating memos into a word processor, or viewing spreadsheets with 3D data visualization. The IT department can also write agent scripts that detect and protect against viruses, monitor the health of the Enterprise, or perform automatic software backups and updates. Much of the drudgery of running the business is being moved to computers while the users can focus on creativity and making money! Multiple computers are constantly exchanging and calculating data on the user’s behalf, who is alerted if any “out-of-bounds” situations occur. The user, and the Enterprise, become more efficient and productive since the desktop PC has the performance to keep pace with the speed of business.

Constant computing on the business desktop will also place increased demands on more servers—fortunately these will also benefit from Intel’s introduction of the 350- and 400-MHz Pentium II processors. And business users are not the only ones who will benefit from this higher performance level. Similar examples can be found in the home where the performance of the PC platform will allow it to concurrently decompress video and audio streams, monitor the home security system, manage the home phone network and scan the Internet, while simultaneously playing a speech-driven, highly interactive 3D game.

I don’t see the demand for more performance ebbing anytime soon. There are still many things businesses and consumers would like to do, such as end-to-end data encryption and knowledge-based information management, as a few more examples of transparent, constant computing tasks. These new applications will continue to require more processor performance, and Intel will continue to deliver this performance on a Moore’s Law schedule.

About the Author:
Paul Otellini (http://www.intel.com/pressroom/kits/bios/otellini.htm) is responsible for Intel Architecture businesses and strategies. Reporting to him are Intel's computing business units including the Business Platform Group, the Consumer Products Group, the Mobile and Handheld Products Group, and the Enterprise Server Group.

For more Information:
Intel is also enabling the industry with platform building blocks to provide balanced platform solutions that take full advantage of the new 350- and 400-MHz Pentium II processors, including implementation of the new 100-MHz system bus.

Read the top stories in this issue of *Platform Solutions* for more details:

Processors for Multiple Segments:
New 350/400 MHz Pentium® II Processors Leading the Way—by Richard Dracott
http://developer.intel.com/solutions/issue/stories/top1.htm

Delivering the 100-MHz High-Performance Platform—by Sunil Kumar
http://developer.intel.com/solutions/issue/stories/top2.htm

100-MHz System Bus Interconnect Design—by Howard Heck
http://developer.intel.com/solutions/issue/stories/top3.htm

Standard High-Volume (SHV) Servers:
The Platform for Internet Deployment—by Rick Echevarria
http://developer.intel.com/solutions/issue/stories/top4.htm

Top Stories

Processors for Multiple Segments: New 350/400 MHz Pentium® II Processors Leading the Way

By Richard Dracott
MD6 Director of Marketing
Microprocessor Products Group, Intel Corporation

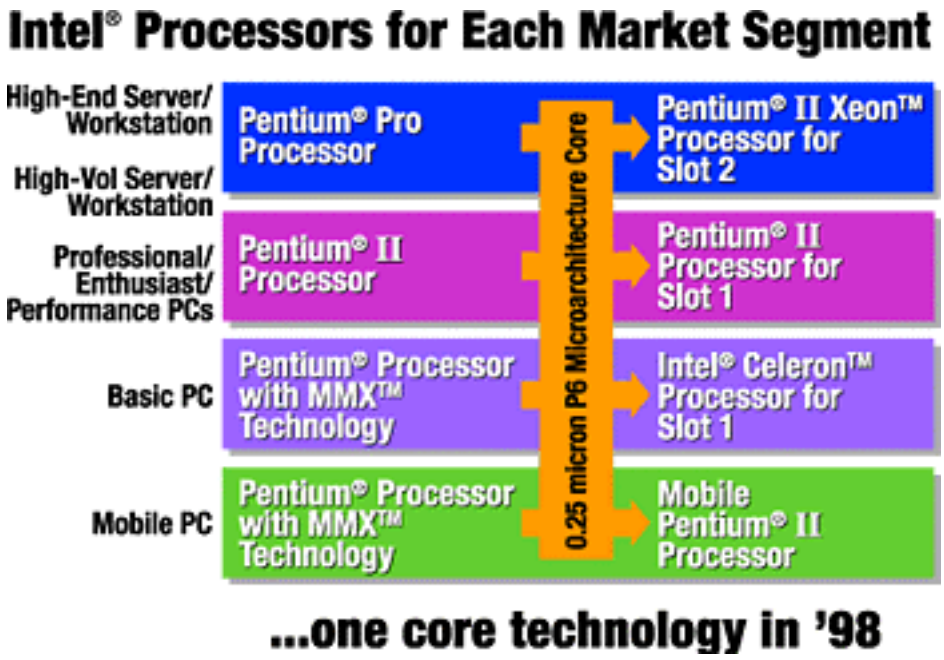
The continued segmentation of the computer marketplace is creating a world characterized by many different application needs and priorities. In response to this trend, Intel is developing and marketing multiple processor products—all based on the same P6 microarchitecture (core processor technology)—to meet the diverse requirements of today's users.

The most recent example of this strategy in action is the introduction on April 15th of the Pentium® II processor at 350 and 400 MHz. This product is designed specifically to meet the needs of professional desktop users in the business community, high-performance enthusiasts in the consumer marketplace, as well as dual and single processor high-volume servers and workstations. Based on Intel's 0.25-micron process technology, the new Pentium II processors at 350 and 400 MHz are the first processors to feature a 100-MHz system bus. The 100-MHz P6 bus provides a system with 50% more bandwidth than the current 66-MHz system bus. Overall, 400-MHz Pentium II processor-based systems will provide up to 20% more performance than those based on the 333-MHz Pentium II processor.

On April 15th Intel also introduced the new Intel® Celeron™ processor. The Intel Celeron processor has been designed specifically to meet the needs of the Basic PC market. The first Celeron processor operates at 266 MHz and is based on the same P6 microarchitecture as the Pentium II processor. Lacking a L2 cache and housed in a new Single Edge Processor Package (SEPP), the Celeron processor has been designed to enable systems priced below $1,000. While supporting this affordable system price point, the Celeron processor offers the best performance for a Basic PC processor. A 266-MHz Celeron processor-based system will perform up to 15% faster on multimedia applications and 35% faster on 3D/floating-point applications than a system based on the 233-MHz Pentium II processor with MMX™ technology.

These products follow on the heels of the April 2nd introduction of the first Pentium II processors for the mobile market segment. Operating at 233 and 266 MHz, the mobile Pentium II processors bring the desktop-equivalent performance of a Pentium II processor to notebooks for the first time. And since the mobile Pentium II processor is also based on the low-power 0.25-micron process technology, notebooks based on the mobile Pentium II processor will have the same long battery lives users have come to expect from notebooks based on the Pentium II processor with MMX technology.

Multiple Processors for Multiple Market Segments
With these major product introductions in April, Intel now offers P6 microarchitecture-based processors for all market segments. The chart below shows the product transition occurring in 1998 for each segment.



The volume-priced mainstream segment in business computing is the Performance Desktop, which today is the domain of the Pentium II processor at 300 and 333 MHz. The next segment is the Professional Desktop. Business users in this segment require the highest processing performance available on the PC platform, to accommodate the demanding requirements of visual computing and electronic business applications such as digital imaging, 3D visualization, video communications and the newer plug-ins for Internet and Intranet communications. The Pentium II processor at 350 and 400 MHz is ideally suited for the Professional Desktop segment. Its multiprocessing capabilities and high-bandwidth 100-MHz system bus also make it well suited for the High-Volume Server and Workstation segments. In the entry-level, the 266-MHz Celeron processor provides the best solution for Basic PCs for business. The Celeron processor provides the performance necessary for standard productivity and Internet applications at an affordable system price. For notebook users, the mobile Pentium II processors at 233 or 266 MHz provide desktop level performance while maintaining long battery lives.

Similar price/performance segmentation exists in consumer computing, starting with Basic PCs based on the Intel Celeron processor, leading to volume-mainstream Performance Desktops and culminating with the highest performance Enthusiast Desktops. The Enthusiast segment features high-speed, advanced-design PCs that have the performance to handle leading-edge Internet technologies and content, as well as visually realistic 3D graphics, video capabilities and the newest games and multimedia applications. With the Pentium II processor at 350 and 400 MHz, PCs in the Enthusiast Desktop segment will now be capable of delivering host-based DVD playback, faster digital imaging, detailed 3D graphics for realistic effects, and smooth animation for fast-paced action.

Balanced Platforms based on the Pentium® II Processor
Systems based on the new Pentium II processors at 350 and 400 MHz offer much more than just higher clock frequencies. Its high-bandwidth 100-MHz system bus paves the way for much faster transfer of data from main memory to the processor, marking it as the first Intel® processor to go beyond today's prevailing state-of-the-art 66-MHz system bus. This new feature is ideal for large data set applications that cannot fit into L1 and L2 cache memory.

Intel has also enabled other building blocks that balance the platform to take full advantage of the performance of the new Pentium II processors. This includes AGP graphics support via the new Intel® 440BX AGPset and Intel740™ graphics processor, fast 100-MHz SDRAM memory, and high-performance I/O interfaces to support USB peripherals. To help the platform developer put together all the pieces, Intel is providing a complete set of design tools, including guidelines for 100-MHz system interconnect, as well as design guidelines for the Intel 440BX AGPset.

More coming in 1998…

The new Pentium II processor at 350 and 400 MHz, and the 266-MHz Celeron processor, are the latest examples of Intel's strategy of introducing a variety of processors for multiple market segments during 1998. Each processor combines the high performance of the P6 microarchitecture with design characteristics and pricing optimized for specific platform implementations. Later in 1998, Intel will introduce additional processors that offer greater performance and enable Intel® Architecture based systems to reach new market segments.

Coming mid-year will be new Pentium II processors based on the Slot 2 form factor. These Pentium II processors are being designed to meet the specific needs of the mid- to high-range of the workstation and server market segments. The Slot 2 Pentium II Xeon™ processors will feature L2 caches larger than 512K, operating off an L2 cache bus operating at the same speed as the processor. The bigger and faster L2 caches will enable the Slot 2 Pentium II processor to meet the data-intensive requirements of high-end server and workstation applications. The Slot 2 Pentium II processors will also be highly scalable, offering 4-way multiprocessing and beyond.

In addition to the Slot 2 processor, Intel will introduce improved versions of its other P6 microarchitecture processors. The mobile Pentium II processor will reach 300 MHz, the next member of the Intel Celeron processor family with on-die L2 cache will also make its debut, and the Pentium II processor will reach 450 MHz.

In 1998, all segments of computing will continue to reap the benefits of a common core Intel Architecture and the move to Intel's 0.25-micron process.

About the Author

Richard Dracott is Director of Marketing in Intel's Microprocessor Products Group MD6 division, where he is responsible for product and technical marketing strategy and communications related to Intel's Pentium II processor product line.

For More Information

Pentium II processor developer Web site—
http://developer.intel.com/design/pentiumII/
Celeron processor developer Web site—
http://developer.intel.com/design/celeron/
Mobile Pentium II processor developer Web site—
http://developer.intel.com/design/mobile/
Intel 440BX AGPset product Web site—
http://developer.intel.com/design/agpsets/440bx/index.htm
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Intel 440BX AGPset Design Guidelines—
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Memory Technology news page in *PSN*—
http://developer.intel.com/solutions/tech/mem.htm

Delivering the 100-MHz High-Performance Platform

By Sunil Kumar
Chip Set Product Marketing Manager
Peripheral Components Division, Intel Corporation

With the introduction of the 350- and 400-MHz Pentium® II processors, the PC performance bar has been raised once again. This new processor is not only up to 20% faster than its predecessor, the 333-MHz Pentium II processor with a 66-MHz system bus, but it also boasts a new 100-MHz system bus that can produce up to a 50% increase in system and memory bandwidth. The result is a high-performance platform ideal for today's advanced visual computing, Internet, and E-business applications used by professional desktop, entry-level workstations and servers in business and PC enthusiasts in the home.

Moving to a 100-MHz system bus changes the infrastructure of the whole platform, creating significant challenges for the platform developer to balance platform performance. Not only does the main memory and chip set require leaps in performance, but clock drivers and other support peripherals are necessary, as are thermal, EMI, routing, and other design considerations. The primary challenge is how to deliver this new level of performance in a balanced platform without adding significant new cost drivers.

Intel is making it easier by taking a total system view and enabling the entire 100- MHz platform. As part of its ongoing efforts to work closely with the industry, Intel is providing much more than just faster processors. Let's take a closer look at some key technology enablers Intel is providing to balance the platform and make the transition easier:

- faster memory
- enhancements in chip set design with the introduction of the Intel® 440BX AGPset; and
- a complete set of developer design tools.

Faster Memory

In order to ensure 100-MHz main memory was available in volume at platform introduction, Intel worked very closely with the DRAM industry from the beginning. To avoid adding to the cost of memory components, Intel led the development of a specification for 100-MHz SDRAM called the PC 100 memory specification (http://developer.intel.com/design/pcisets/memory/index.htm) that can be implemented within the existing DRAM manufacturing infrastructure.

100-MHz SDRAM was developed simultaneously with the Intel 440BX AGPset, so that feedback from the memory industry could be integrated into chip set design. This industry cooperation resulted in optimal levels of interoperability and compatibility, including a DIMM specification so that every 100-MHz SDRAM DIMM component, regardless of manufacturer, will look and function the same.

The finishing touch on the PC 100 memory specification was the creation of an external test facility that allows manufacturers to obtain valuable feedback on compliance issues. As a result of this industry-wide design effort, multiple vendors are shipping interoperable and compatible 100-MHz SDRAM components in volume today.

Chip Set Enhancements

To support the increased system bandwidth demands of the 100-MHz bus, the new Intel 440BX AGPset builds on the Quad Port Acceleration (QPA) architecture introduced in 1997 with the Intel® 440LX AGPset. With approximately twice the number of transistors as its predecessor, the Intel 440BX AGPset provides higher levels of concurrency to dramatically improve performance. Enabling this higher system bandwidth requires three essential enhancements in chip set design:

- ***Enhanced distributed arbitration***—distributed arbitration is enhanced between the 350- or 400-MHz Pentium II processor, the AGP graphics processor, the PCI bus, and 100-MHz SDRAM memory enables system performance gains.
- ***Deeper buffers***—builds on the already well-established foundation of Quad Port Acceleration to deliver faster data throughput.
- ***Improved memory management***—increases the number of pages that can be simultaneously opened in memory to 32. This decreases latency by eliminating the overhead of opening and closing pages in a multitasking application environment.

In addition to higher system bandwidth, the Intel 440BX AGPset improves reliability and data integrity. It supports multiple copies of memory control signals for improved reliability, and implements a technique called *hardware scrubbing* which increases data integrity by allowing the memory controller to automatically correct ECC errors and identify DIMMs that may contain multiple errors.

Intel's new chip set design also offers flexible support for both 66-MHz or 100-MHz designs, allowing developers to cost-effectively provide a choice of performance options for different market segments, using a standardized platform. In addition, the new chip set provides full ACPI support for the Instantly Available PC (http://developer.intel.com/solutions/tech/power.htm) to communicate when it appears to be off, yet wake up instantly on demand.

Design Tools

Perhaps one of the most important aspects of platform development is how to put it all together, quickly and cost effectively. Intel is helping here too with a complete set of design tools intended to help the platform developer meet his development goals with low-cost, fast time-to-market designs.

Intel used its advanced simulation design methodologies to create a robust set of 100-MHz system design guidelines (http://developer.intel.com/design/pcisets/designex/290634.HTM) which address various issues including detailed pin-outs, timing issues and component design considerations. One key area is system interconnect design. See the top story in this issue of *Platform Solutions* on 100-MHz System Bus Interconnect Design (http://developer.intel.com/solutions/issue/stories/top3.htm).

These design tools enable the cost-effective implementation of four-layer motherboards in the industry-standard form factors of ATX, NLX and micro-ATX. This creates the ability of 100-MHz platforms to ramp quickly into volume price segments.

Delivering 100-MHz Platforms

Memory specifications, advanced chip set designs and design tools are now in place to enable the fast time-to-market implementation of 100-MHz platforms with 350- and 400-MHz Pentium II processors. This enables the industry to deliver the highest performance available through robust, balanced platforms.

1998 represents a year of transition for the PC platform. The Intel 440BX AGPset offers OEMs with a new level of design flexibility for Pentium II processor-based platforms. Platform suppliers now have the capability to implement 66-MHz or 100-MHz designs using the same set of building blocks. The result is a set of cost-effective design solutions with the power to address the price/performance needs of targeted market segments.

About the Author:

Sunil Kumar is the Chip Set Product Marketing Manager in Intel's Peripheral Components Division. He manages Intel's AGPset products for the Performance Desktop, Workstation and Server market segments.

For More Information:

Intel 440BX AGPset product Web site—
http://developer.intel.com/design/agpsets/440bx/index.htm
Intel Chip Sets Product Web site—
http://developer.intel.com/design/pcisets/index.htm
Pentium II processor developer Web site—
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Memory Technology news page in *Platform Solutions*—
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AGP Technology news page in *Platform Solutions*—
http://developer.intel.com/solutions/tech/agp.htm
System Design Technology news page in *Platform Solutions*—
http://developer.intel.com/solutions/tech/sysdes.htm

100-MHz System Bus Interconnect Design

By Howard Heck
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The announcement of the 350- and 400-MHz Pentium® II processors means that the current 66-MHz system bus frequency is no longer adequate. To avoid significant performance limitations due to wasted CPU cycles, it is necessary to increase the system bandwidth to 100 MHz in order to balance platform performance. The key question for designers is how to achieve this 50 percent jump in bus frequency, without resorting to exotic or expensive technologies.

The good news is that going faster does not have to be harder. The new 100-MHz system bus can be cost-effectively implemented using familiar motherboard and interconnect designs. Intel is now providing 100-MHz system bus design guidelines (http://developer.intel.com/design/PentiumII/applnots/24373501.pdf) that will help enable PC suppliers to cost-effectively ramp new high-performance processors into performance mainstream PC products.

A new design methodology

Conventional engineering wisdom dictates that as system bus frequencies increase, the design problem becomes more difficult. Board routing restrictions become tighter, and additional effects, such as cross-talk in connectors, can occur. As the degree of difficulty increases, designers following conventional methodologies run the risk of getting caught in a repetitive loop of “route-simulate-and fix,” never knowing if they are getting any closer to a final solution. Intel has developed a new design methodology that replaces the iterative method with a more straightforward approach. It is based on a technique we call “sensitivity analysis.”

Sensitivity analysis is a predictive “what-if” technique that involves systematically performing thousands of hypothetical simulations to develop a profile of system behavior over all possible solutions (see Figure 1 below). Sensitivity analysis is the “Gremlin-hunter” that enables us to define a solution space that designers can use to turn predictive results into reality, avoiding “Murphy’s Law” scenarios which can crop up in traditional trial and error methods.

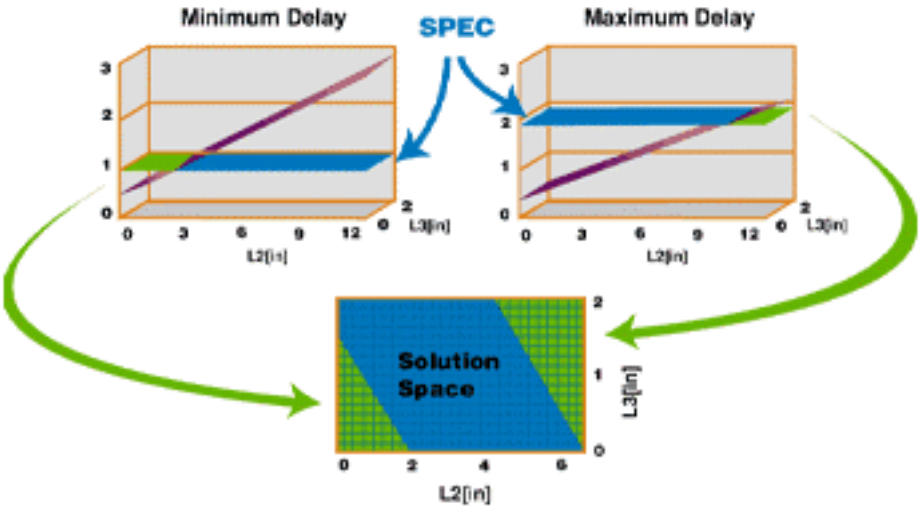

Figure 1. Sensitivity analysis process. System responses are compared against design specs and mapped into a working “solution space.”

For example, a designer might normally expect that trace routing for 100 MHz would be considerably more difficult than for 66 MHz. In reality, this is not the case! While a bus frequency of 66 MHz allows trace lengths of up to 7.00 inches, increasing the frequency to 100 MHz reduces the maximum allowable

trace length to 6.75 inches—a reduction of only 0.25 inch. The results of Intel's sensitivity analyses are now available in the 100-MHz system bus design guidelines (http://developer.intel.com/design/PentiumII/applnots/24373501.pdf).

Commodity PCB solutions work

Intel's design guidelines show how commodity four-layer PCB motherboards and Slot 1 connector designs, now used for 66-MHz systems, are cost-effectively employed in 100-MHz designs. In addition, the guidelines make allowances for conditions that can be difficult to simulate, e.g. simultaneous switching output effects (SSO).

The design guidelines also spell-out the technical requirements for interconnects needed to support 100-MHz system bus designs. For example, existing 66-MHz designs incorporate termination on both the motherboard and the processor. Intel's 100-MHz design allows the motherboard termination to be removed, a technique known as single-end termination (SET). While this approach produces a cost saving, the trade-off is that design constraints are somewhat tighter, due to the shorter trace lengths required. The design guidelines allow developers to explore both approaches.

High performance—no new PCB technology required

The key message for PC platform designers is that making the move to 100 MHz does not require new PCB technology! Intel's design methodology enables the smooth, cost-effective ramping of the newest Slot 1 Pentium II processor technology into performance mainstream PCs, without significant increments in overall design cost. This is also a forward-looking design approach that anticipates future enhancements in Pentium II processor performance. Adhering to the new design guidelines is the best assurance of cost-effective, fast time-to-market implementations.

About the Author

Howard Heck is a senior hardware design engineer in the Intel Architecture Lab, specializing in high-performance signaling and transmission line modeling of printed circuit board applications. He focuses on the development of high-speed system bus solutions for the Pentium II processor family.

For More Information

100-MHz System Interconnect Design Guidelines—
http://developer.intel.com/design/PentiumII/applnots/24373501.pdf
Intel® 440BX AGPset Design Guidelines—
http://developer.intel.com/design/pcisets/designex/290634.HTM
Visit the New System Design Technology page in *Platform Solutions* for the latest information on a monthly basis—
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Intel 440BX AGPset product web site—
http://developer.intel.com/design/agpsets/440bx/index.htm
Pentium II processor developer web site—
http://developer.intel.com/design/PentiumII/index.htm
Memory Technology news page in *Platform Solutions*—
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AGP Technology news page in *Platform Solutions*—
http://developer.intel.com/solutions/tech/agp.htm

Standard High-Volume (SHV) Servers: The Platform for Internet Deployment

By Rick Echevarria
Director, Internet Program
Enterprise Server Group, Intel Corporation

According to industry projections, by the year 2000 the vast majority of servers will be charged with the task of processing information and delivering services via the Internet or Intranet. From core technologies and services such as Web hosting, remote management, security and load balancing, to such advanced applications as electronic commerce IP telephony and virtual private networks, servers will increasingly be called upon to provide new levels of performance and functionality. This challenge means that standards-based server solutions will be sought to provide increasing performance and capabilities in the areas of I/O, security, manageability, and scalability, as well as a choice of operating environments, tools and applications that the next generation of Internet services will inevitably demand.

Intel is playing a leading role in helping to meet this broad set of requirements in today's and tomorrow's standard high-volume (SHV) servers. The Intel® Architecture (IA) has quickly grown to a strong position in the server marketplace because of the many advantages it holds in price/performance and capability, particularly in Windows NT*-based computing environments. That position promises to grow even stronger as IA-based SHV servers become increasingly popular for other Internet-friendly operating environments, such as Solaris* for Intel, Linux*, and BSDI UNIX*.

While the majority of Internet servers in the market today are IA-based, improvements in overall performance, price/performance and flexibility can be achieved to better meet the challenges faced by Internet Service Providers (ISPs)—as well as IHVs, ISVs and OEMs—today and in the future. To that effect, Intel is focusing on promoting an overall standards-based solutions approach designed to deliver the right hardware platform features, promote compelling IA-based Internet software tools and applications, and provide secure, reliable, and manageable server platforms.

Delivering the Right Server Hardware Features

Intel is making a major investment in Internet server platform technology. Efforts include the following:

- Processors and platform designs that scale up the I/O bandwidth and memory capabilities of IA-based servers;
- Creating the Intelligent Platform Management Interface (IPMI) specification as part of Intel's Wired for Management (WfM) initiative to improve server manageability;
- Leading development of the Virtual Interface (VI) architecture technology and distributed message passing to promote clustering applications;
- Server System Infrastructure (SSI) development activities designed to enable the industry with a common set of server element specifications.

These standards-based technologies lead to a robust, multi-vendor industry capable of providing SHV server solutions that meet or exceed the needs of ISPs and their clients.

Enabling Applications and Complete Solutions

Not only is Intel working to enable the right set of server hardware features, it is working directly with software vendors and other solutions providers to enable compelling Internet applications that can take advantage of those features. These efforts include:

- Working with Microsoft Windows NT to test and promote robust remote server management capability.
- Working with top tool and application solution providers such as US Web*, Silver Stream*, and others to validate and tune top Internet software for optimal performance on SHV servers.
- Working with leading Internet companies such as Yahoo!* to validate new processors and server products for use in Internet applications.

In addition, Intel has made equity investments in a number of software companies focused on the Internet. Examples are Inktomi* and Silver Stream. Inktomi is a company that develops scalable network applications to dramatically improve Internet information access and delivery, including Web caching and load balancing technology. Silver Stream is an ISV whose products allow developers and power users to easily develop and deploy sophisticated, HTML- and Java-based business applications for accessing relational databases and rich content. Intel also has a significant in-house software development effort of its own, as shown by its September, 1997 introduction of Intel® Quick Web software which enables Web pages to be served up faster than was previously possible.

Last year, Intel worked with SAP* to form Pandesic LLC*, a jointly-owned venture of Intel Corporation and SAP America, Inc. Pandesic LLC is focused entirely on
E-business by providing a full-featured, low-cost, turnkey approach to conducting commerce on the Internet.

Intel Leading into the Future
Moving forward, Intel will continue to concentrate on improving Internet server hardware in the areas of raw performance, price/performance, and I/O bandwidth. Software efforts will be focused on enabling the broadest choice of operating environments, tools and application solutions for the Internet, with emphasis on remote manageability and security, along with E-commerce technologies and solutions.

With its standards-based platform technology efforts and its Internet application efforts, Intel is playing a significant role in the evolution of Internet server technology. As new processor and platform technologies continue to increase IA-based SHV server performance, and new applications are enabled that take advantage of those increases, that role will only get stronger in the future. Look for future articles in *Platform Solutions* that will explore the results of Intel's efforts to advance the capabilities of IA-based Internet server platforms.

About the Author:
Rick Echevarria is Director of Intel's Internet Server Program. He is responsible for developing Intel's Internet server strategies and managing relationships with ISPs and OEMs, as well as overseeing marketing programs designed to raise awareness of IA-based servers in the Internet.

For More Information:
Server Platform news and information—
http://developer.intel.com/solutions/platfms/server.htm
Intel Quick Web technology—
http://www.intel.com/quickweb/whatisit.htm
Intelligent Platform Management Interface (IPMI) —
http://developer.intel.com/solutions/tech/platmgmt.htm
Virtual Interface (VI) Architecture technology—
http://www.intel.com/procs/servers/isv/vi/index.htm
Latest news on Server Systems Infrastructure technology—
http://developer.intel.com/solutions/tech/ssi.htm
Solaris for Intel—
http://www.sun.com/software/Products/x86.html
Pandesic LLC—
http://www.pandesic.com
Inktomi—
http://www.inktomi.com
Silver Stream Software, Inc.—
http://www.silverstream.com

Platform News

EXTRA!!!

Download Presentations Given by Intel's Executives and Technologists at WinHEC
http://www.intel.com/solutions/tech/xtra/winhec.htm

Business Platforms

Intel Takes System Management to New Heights with Alert on LAN* Solution
New Intel® LANDesk® Client Manager v3.3 and LAN on Motherboard Chip Set Combine to Deliver Alert on LAN* Solution to PC OEMs. Alert on LAN is a new technology that alerts network administrators when a PC has a problem, even if the PC is powered down, or the operating system is unavailable. From a system management perspective, Alert on LAN technology helps the network administrator to react quickly and effectively when problems occur, rather than waiting for input from the end user. http://www.intel.com/pressroom/archive/releases/LD041598.HTM

Intel Helps Extend Reach of Enterprise Vendor Solutions Over Millions of Managed PCs and Servers
Intel introduced Intel® Application Integration Modules (AIMs), which allow IT managers to integrate the system health management capabilities already installed on millions of servers, desktops and mobile PCs with their existing enterprise management solutions.
http://www.intel.com/pressroom/archive/releases/LD040798.HTM

Server Platforms

Pentium® II Xeon™ Processor to Be New Brand Name for Processors Specifically Designed for Servers and Workstations
Intel announced Pentium® II Xeon™ (pronounced "ZEE'-on"), a new brand name for a line of processors that will be designed specifically to meet the needs of midrange and higher server and workstation applications. Intel's Pentium II Xeon processor will offer leadership performance and scalability for those manufacturers designing workstations and servers. Intel will introduce the processors in mid-1998 with system products to follow shortly thereafter.
http://www.intel.com/pressroom/archive/releases/sp042098.htm

Server System Infrastructure (SSI) draft specifications Rev 0.6 Now Available
SSI draft specifications for entry and mid-range systems are now available. Contributors may now post comments, suggestions and questions at the SSI Forum page. http://www.ssiforum.org

Home Platforms

Intel and Microsoft to Align Efforts on Interactive TV Programming
Intel and Microsoft announced that they will work together to provide an integrated platform for broadcasting interactive television content to PCs and other devices. To further this objective, Intel's Intercast® software will be integrated into appropriate Microsoft® products, starting with the WebTV® for Windows® feature of the Microsoft Windows 98 operating system. Intel and Microsoft view this as the first step toward development of a common framework for enhancing TV programming with data that will be available on a variety of platforms, including PCs equipped with TV tuners. The initial focus will be on analog broadcasts, expanding to digital broadcasting as the digital infrastructure develops.
http://www.intel.com/pressroom/archive/releases/CN40898A.HTM

Intel and PBS Collaborate on Digital Broadcast Programming
Intel and the Public Broadcasting Service (PBS) announced they are collaborating to create digital broadcast programming, the first such arrangement between a major broadcast network and a computer industry leader. The companies will enhance information-rich programs, such as documentaries and educational shows, with complementary material, using Intel's Intercast® technology, which allows the transmission of data with a television broadcast. PBS will oversee production of the programs and Intel will provide technical support and technology to enable the rich video-plus-data programming made possible by digital broadcasting. http://www.intel.com/pressroom/archive/releases/CN040698.HTM

Hitachi America to License Digital TV Decoder Technology to Intel
Hitachi America, Ltd. and Intel announced that Hitachi America, Ltd. will license its "All Format Decoder" (AFD) technology to Intel. Intel expects the technology to be used in digital television (DTV) trials later this year and available on digital broadcast receivers, such as PCs, in 1999.
Intel will incorporate the Hitachi AFD technology in software to enable PCs to decode digital TV signals, which are mandated by the FCC to be broadcast from TV stations beginning in November 1998. Intel's implementation of the Hitachi AFD will ensure that broadcast-ready PCs will display all ATSC formats, regardless of whether the signals are transmitted in high definition or standard definition or whether the signal is formatted in progressive scan or interlaced scan.
http://www.intel.com/pressroom/archive/releases/CN40698A.HTM

Intel and Microsoft Work Together On In-Car Computing Solutions
Applications for in-car computing, such as voice-activated navigation, hands-free voice/data telephony, driver information and entertainment for drivers and passengers, will soon be realized through the combined efforts of Intel and Corporation. At the third annual Microsoft® Windows® CE Developers Conference, the two companies announced that they are collaborating on a common vision for in-car computing. To deliver on this vision, the two companies will work together to develop platforms based on Intel Architecture processors and the AutoPC platform, powered by Windows CE. Intel and Microsoft are also collaborating with key companies in the automotive industry to bring entertainment, computing and communications to the car using widely accepted technologies from the computing industry. http://www.intel.com/pressroom/archive/releases/cp040798.htm

Mobile Platforms

First Mobile Pentium® II Processor at 266 MHz Announced
Intel has introduced the first Pentium II processor for mobile PCs. The mobile Pentium II processor, offered at speeds of 233 and 266 MHz, brings a new level of performance and computing capability not previously available to mobile PC users. The mobile Pentium II processor delivers the advanced performance capabilities of the P6 microarchitecture while meeting the unique power consumption and size requirements of mobile PCs. The mobile Pentium II processor is available in an innovative "mini-cartridge" package, which contains the processor core and closely coupled 512K Level 2 cache. The mini-cartridge is about one-fourth the weight, one-sixth the size and consumes two-thirds of the power of the Pentium II processor desktop Single Edge Connector (SEC) cartridge, making it well suited for today's broad range of mobile PC form factors, including thin, lightweight, ultra-portable systems. For all your developer resources, please check the Mobile Pentium II processor developer site.
http://developer.intel.com/design/mobile/mobile_pentiumII.htm

Workstation Platforms

Application Solutions Centers (ASC) Assisting ISVs
ASCs are assisting key software developers in developing and optimizing their technical workstation applications to run on Intel Architecture based workstations. Companies that have publicly announced their ASC's include Compaq and NEC. http://www.intel.com/businesscomputing/wrkstn/asc.htm

IA-64™ Architecture Building Momentum
This is evident by some of the key ISV's with technical workstation applications publicly committing to developing and making available Merced™ processor based applications. Such companies cover a wide range of market segments and include Adobe*, Parametric Technologies Corp.*, Softimage*, Avid*, Cadence*, Synopsys*, MSC*, Mentor Graphics* and Mental Images*. Intel's Merced processor, the first IA-64 architecture processor, is expected to be shipping in the late 1999 timeframe.

Technology News

Microprocessor

New 350 and 400 MHz Pentium® II Processors Announced for Performance Segments
Intel's highest performance processor integrates the best attributes of the P6 microarchitecture—Dynamic Execution, Dual Independent Bus (DIB), a multi-transaction system bus, plus Intel's media enhancing MMX™ technology. At 400 MHz, the Pentium II processor delivers up to a 20% performance boost over the 333 MHz Pentium II processor and improves system bandwidth and performance by increasing the system bus speed from 66-MHz to 100-MHz. The new 350 and 400 MHz Pentium II processors are targeted for professionals, avid PC users, and PC gamers, or the Enthusiast and Professional desktop segments. They also meet the needs of entry-level to mid-range servers and workstations. **See more information below on chipsets and design guides to support the new 100 MHz system bus.**
http://developer.intel.com/design/pentiumII/

Updated Pentium II Processor Design Guides and Application Notes
Now that Intel's new 350 and 400 MHz Pentium II Processors are available with a 100-MHz system bus, all the information that developers need for design has been updated. These include Slot 1 application notes on: CPU-ID, GTL+100, EMI-100, Mechanical, Thermal, and Power-100.
http://developer.intel.com/design/PentiumII/applnots/

New Intel® Celeron™ Processor Announced for Basic PCs
The new Intel Celeron processor, at 266 MHz, is Intel's first entry into the Basic PC (sub-$1200) market segment. The Intel Celeron processor meets the core needs and affordability requirements common to many new users. The processor core has 7.5M transistors and is based on Intel's advanced 0.25 micron CMOS process technology. The Intel Celeron processor benefits from the same P6 microarchitecture core as the Pentium II processor. http://developer.intel.com/design/celeron/

Developer Resources Now Available for New Celeron Processor
Visit the Celeron Processor developer web page for all the new developer resources available to assist you with your Basic PC platform designs, including application notes, data sheets, manuals, manufacturing tips, and performance indicators. http://developer.intel.com/design/celeron/

AGP

Intel® 440BX AGPset Announced for New 350/400 MHz Pentium II Processor Systems
The Intel 440BX AGPset is the first chip set to deliver 100-MHz system level bandwidth to unleash the full performance of the 350-MHz or 400-MHz Intel® Pentium® II processors. In addition, the Mobile Intel® 440BX chip set is the first chip set to bring Pentium® II processor performance to mobile systems.
http://developer.intel.com/design/agpsets/440bx/index.htm

New Design Guide Available for the Intel 440BX AGPset
This document provides design guidelines for developing Pentium II processor / Intel 440BX AGPset based systems. Motherboard and memory subsystem design guidelines are covered. Special design recommendations and concerns are presented. Likely design issues have been identified and included in a checklist to alleviate problems during the debug phase. Two reference board designs are presented – one for Single Processor and one for Dual Processor designs.
http://www.intel.com/design/pcisets/designex/290634.htm

Intel® 440EX AGPset Announced for New Celeron Processor Systems
Designed with a feature set tuned for the Basic PC market segment, the Intel® 440EX AGPset balances the Intel® Celeron™ processor system performance. The result: a new generation of cost-effective PCs with the added performance feature of AGP. http://developer.intel.com/design/agpsets/440ex/index.htm

Bibliography of Impedance Compensated Driver Papers Related to AGP 4X Buffer Design
The papers listed in the bibliography describe various means and devices for impedance compensated output drivers. The information is intended to give designers ideas related to the design of buffers for AGP 4X. http://www.agpforum.org

Three new AGP Interface Specification ECRs Available
Three new ECRs on the AGP Implementers Forum Web site are now available: ECR 43 IVDDQ, ECR 44 3.3V VDDQ (min) change, and ECR 45 Secondary Side Keepout removal. http://www.agpforum.org

New AGP VxD with Performance Improvements Available (VgartD v1.0.22)
Intel has posted an updated version of its AGP VxD with performance improvements on the AGP Implementors' Forum Web site: VgartD v1.0.22. http://www.agpforum.org

DVD

Intel Rallies PC and Content Industries to Bring DVD Technology to European PC Users
Intel brought the PC and software content industries together on April 2-3 in Duesseldorf, Germany for Europe's first DVD (Digital Versatile Disk) industry event. The "DVD on the PC" event was attended by more than 80 representatives of Europe's PC hardware, software and reselling communities who share a goal of accelerating the delivery of DVD drives and software content to European PC users. The event also included Europe's first DVD "Plug Fest," at which developers of DVD hardware and content tested their products in a broad variety of configurations to ensure interoperability and ease of use. Overall, the "DVD on the PC" event demonstrated the industry's readiness for broad DVD deployment in 1998.

PC 98 and PC 99

Summary of Differences between PC 98 and PC 99
A list is available that summarizes the key changes proposed for PC 99, in comparison to the requirements and recommendations defined in the *PC 98 System Design Guide*. All sections of the design guide are covered in the list located at the PC 98 and PC 99 technology page in *Platform Solutions* online. You can also find the PC 99 System Design Guide Draft and Review Process Deadlines at this page. http://developer.intel.com/solutions/tech/pc98.htm

System Design Technology

New System Design Technology page available in *Platform Solutions* Online
This new technology page is made available to keep the platform developer aware of design tools and documentation from the Intel Architecture Labs (IAL). One of the focus areas of IAL is on system design techniques that enable the design and implementation of high-performance processors and platform technologies, within cost-effective system designs. Some examples of the new documents you can find referenced on this page are: CK100 Clock Buffer: Preliminary EMI Layout Guideline (Rev 0.51), Notes on Spread-Spectrum Clocking (SSC) and Its Timing Impacts, and Notes on AGP Interface Architectures and Motherboard Design with SSC. Check back monthly for the latest system design technologies available.
http://developer.intel.com/solutions/tech/sysdes.htm

100-MHz System Interconnect Design Guidelines Now Available
The goal of this layout guideline is to provide a system designer with the necessary information for designing the printed circuit board layout of a 100-MHz GTL+ system bus using the new 350 or 400 MHz Pentium II Processor and Intel 440BX AGPset.
http://developer.intel.com/design/PentiumII/applnots/24373501.pdf

Industry Events

Comdex Spring ’98
April 20–23, Chicago, IL
Key international event for the entire computer industry. Intel’s Executive Vice President, Paul Otellini, executive vice president and general manager of Intel Architecture Business Group, will give the keynote address on Tuesday, April 21. During his keynote, entitled "Architecture for Everyone," Otellini will discuss the latest computing trends and demonstrate computing solutions powered by new and compelling technologies. He will share Intel’s vision of 1 billion connected computers and how technology is becoming a way of life. You can view his keynote via webcast at Intel’s Spring Comdex site.
http://www.intel.com/intel/comdex98/spring.htm

USB Compliance Workshop
April 29–30 and May 1st, Milpitas, CA
For Invitation, Registration and Details, please visit the USB Implementers Forum Web site.
http://www.usb.org/develpers/index.htm

PCI Expo ’98/PC Developers’ Conference
May 18-22, San Jose, CA
PC and industrial developers' conference for hardware and software engineers. Intel will provide keynotes on connectivity and USB. http://www.annabooks.com

USB Plus Developers’ Conference
May 20–22, 1998, San Jose, CA
The USB Plus Developer's Conference will be co-produced by USB-IF and Annabooks. In this 3-day conference, you will hear first hand from knowledgeable speakers currently defining and developing state-of-the-art USB products. Registration and program coordination will be handled by Annabooks. To register simply visit the Annabooks Web site (http://www.annabooks.com/confer/pciregis.htm). Exhibiting opportunities are available: Contact Shauna Wilson via e-mail (dwilson1@san.rr.com) or call (619) 689-4942.

ATM Expo ’98
June 01-05, San Jose, CA
Event dedicated exclusively to Asynchronous Transfer Mode and broadband technologies. Intel's Mitch Shultz will be presenting "Servers and ATM" on June 5th. For more information, please visit the event Web site. http://www.atmyear.com//atmyear98us/index.htm

PC Expo ’98
June 16–18, New York, NY
An international broad-based computer show. For information please visit the PC Expo Web site.
http://www.pcexpo.com

Web Design & Development ’98 West
June 21–25, San Francisco, CA
This conference is designed to connect web developers and offer education about how to improve web design. Intel's Jerry Weber will be presenting "Low Bandwidth Special Effects for the Internet" on June 25th. For more information, please visit the event Web site.
http://www.web98.com

2nd Annual U.S. 1394 Developer’s Conference
June 29–July 2, San Jose, CA
Please visit the 1394 event site for more details. http://www.1394ta.org/upevents/overview.htm

Internet World—summer
Jul 13–17, Chicago, IL
Focuses on breakthrough technologies and products from leading innovators, devoted exclusively to the Internet and World Wide Web. Intel's Ken Stober to present PC/TV. For more information go to http://events.internet.com

Siggraph '98
Jul 21 - 23-July, Orlando, FL
Provides marketplace for computer graphics equipment and services, for more information please contact http://www.siggraph.org/s98/s98main.html

HP World '98
August 2–8, San Diego, CA
HP strategic and tactical solutions come together. Focusing on technology, connectivity, and platforms. Intel will have 3 speakers. For more information, please contact http://www.hpworld.org/

California Computer Expo
August 20–23, San Diego, CA
Enhancing the home and office through computer technology, Intel will present a paper on "Home Networking - Unleashing the Power of the Multi-PC Home. http://www.computoredge.com/expo/

Intel Developer Forum
September 15–17, Palm Springs, CA
Features 12 Graduate Level technology tracks. Over 70 technical sessions will focus on the latest desktop, mobile, server, and workstation platform technologies. http://developer.intel.com/design/idf

Intel Networking Events & Training

For Intel's events and training programs on networking products and technologies, please visit the Intel networking events page. http://www.intel.com/network/events/index.htm

—End of Platform Solutions Issue 8—