



WORKSTATION PROCESSOR AND CHIPSET

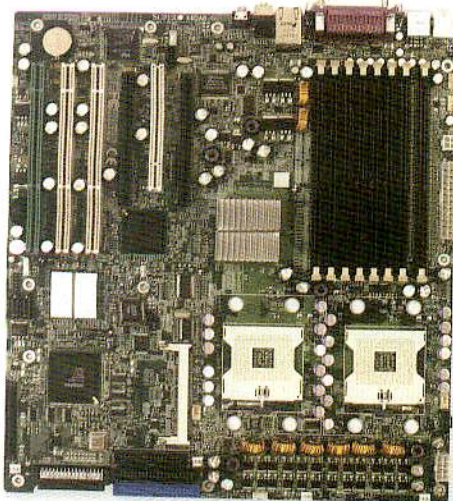
Intel E7525 chipset and Extended Memory 64 Technology

PROSPECTS Our first look at Intel's answer to AMD64. But there's a lot more to the new Xeon platform than 64-bit processing.

Intel has a habit of sneaking out important technologies by the back door, with scarcely a fanfare to send them on their way. Hyper-Threading, now an important part of the Pentium 4 branding, arrived with little ceremony in Prestonia 2GHz Xeon workstation processors (see *issue 90, p113*). Now Intel has chosen to unleash its answer to AMD64's 64-bit operation in a similarly low-key fashion. Called Intel Extended Memory 64 Technology (EM64T), it adds 64-bit registers to a new Xeon CPU, codenamed Nocona. But much more than that, it includes a whole raft of changes to the platform to bring it bang up to date with the latest technologies.

THE E7525 CHIPSET

Our first look at EM64T was in a white box system supplied to us by Boston Limited (www.boston.co.uk). The Boston workstation encompasses all the latest technologies in the new platform, making it a good showcase. It uses the new 'Tumwater' E7525 chipset, which supports DDR2 memory. This, in theory, offers twice the memory bandwidth over traditional DDR, which will benefit video editing and encoding, or 3D rendering. There's a 16GB maximum memory capacity, although our test system was supplied with just 2GB. The motherboard used is the SuperMicro X6DA8-G2, which includes everything that you'd hope for in a high-end workstation/server board. Notably, there are two gigabit LAN ports and an on-board Adaptec 7902 SCSI controller.



The new chipset supports up to 16GB of memory, and this motherboard has sockets to spare.



This Boston case is our first look at Intel's latest technology.

But the biggest new inclusion with E7525 is PCI Express. This is supported in its 16x incarnation, which offers much more bandwidth than AGP. Most significantly, it allows data transfer both to and from the graphics processing unit. The advantage of this will become more apparent in the not too distant future, when work is offloaded to the GPU to perform tasks such as encoding and decoding HDTV. It's particularly useful for complex interactive physical simulations like water, which aren't possible with AGP. The SuperMicro board has two PCI Express slots, so is ready to take advantage of the SLI (Scalable Link Interface) solutions nVidia is now offering. Gaming performance aside, this will be beneficial for high-end 3D simulation applications.

THE XEON NOCONA PROCESSOR

Our white box came supplied with two 3.4GHz Intel Xeons sporting the new Nocona core. The new Xeons are available at speeds of up to 3.6GHz and run on an 800MHz front side bus, rather than the 533MHz of their predecessors. Unlike the latest Pentium 4 incarnation's new packaging, this chip still uses the 604-pin package of the current Xeon, but there have been changes inside the CPU itself. Architecturally, the processor now uses the 90nm Prescott core, but with the addition of the EM64T 64-bit instruction set. Unlike the previous Northwood-based Xeons, these have 1MB of Level 2 cache and our

particular chips lacked Level 3 cache, although we expect models incorporating L3 to be on the roadmap. Just like the Prescott Pentium 4s, these chips run hot. Dell has gone as far as saying that it won't be building servers around them, but it has still launched a workstation range.

Despite being used in servers for a while now, 64-bit computing has not had a huge effect on the workstation market as yet. AMD has had the 64-bit Opteron ready since April last year and Linux distributions to go with it, but for most users the lack of a 64-bit Windows OS and 64-bit drivers have been a great hindrance. As the 64-bit editions of Windows XP and 2003 Server draw closer to completion, Intel clearly felt that now is a good time to enter into competition with the AMD64 platform.

Unlike the Itanium, neither the Nocona or Opteron are true 64-bit processors. They both have the ability to run in 32-bit or 64-bit mode, but in order to access memory above the 4GB maximum of 32-bit computing, a bounce buffer is used. AMD has implemented this bounce buffer in hardware, while Intel has chosen the software route. In extreme cases, when trying to use more than 4GB of memory, the Nocona can have a noticeable 30-50 per cent decrease in performance. AMD decided to double the number of integer registers when in 64-bit mode because of this. So, unlike Intel, in some situations there is a performance boost when running in 64-bit mode. Microsoft is quoting an 8 per cent overall system performance boost, while other reports suggest as much as 47 per cent in certain cases.

But we aren't going to know the true 64-bit performance of both these processors until there's a working copy of Windows and drivers to go with it. We tried installing the current beta on the Nocona system but to no avail. This would imply that although AMD64 and EM64T are essentially the same instruction set, they're not quite 100 per cent compatible. We'll have to wait and see if this has implications for cross-compatibility of applications written specifically for either of the two processors.

THE 64-BIT QUESTION

Despite all the AMD-fuelled hype about the potency of 64-bit computing, it's probably best to look past the 64-bit aspect of the E7525 and Xeon with EM64T combination. Instead, what you have here is a top-end 32-bit system with all the latest technologies. The 64-bit computing is merely a future bonus when it arrives. PCI Express is the true killer app, as it's not currently available on the Opteron platform.

If you're running the most recent generation of Xeons, raw performance may not be a huge leap forward, although the faster memory and 800MHz FSB could be very beneficial for applications that can take advantage of it. Next issue we'll be reviewing a full production sample of the new platform, including extensive performance testing, so we'll have some more concrete answers then.

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