behind the news

Ever thought you could produce more work if you had two PCs? That's what Intel thought, too, and so it created hyperthreading. Will Head looks at how the chipmaker's latest technological innovation will help future processors get round the speed issue

When is a processor not a processor? When it is two logical processors. Intel's cunning server trick of making one single CPU appear as two is set to hit the desktop with the launch of its new 3GHz Pentium 4 chip.

With hyperthreading enabled the operating system behaves, to all intents and purposes, as if two processors were present even though only one actually exists. The benefit of two physical processors is an obvious one – although you won't get double the performance, there will certainly be an increase as more processing power is available to handle the workload. Hyperthreading cannot promise this, but it can make more efficient use of the processing power available.

But for multiprocessing to work, both the operating system and the application in question need to be aware that there's more than one processor at their disposal.

Supporting role

Microsoft's NT product line (Windows NT 4.0 and 2000) supported multiprocessing, while Windows 9x and Me did not. With the move to XP, based on the NT heritage, the operating system side is ready. Both XP Home and Professional support hyperthreading so there should be no problems there.

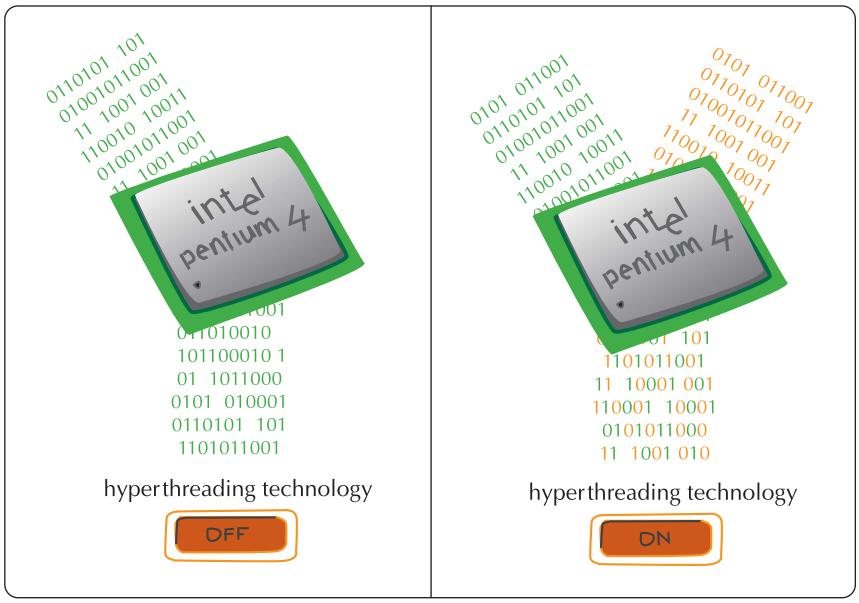
> On a hyperthreaded system two tasks are sent to the processor at one time. While the processor is waiting on task one it can be getting on with task two

The only proviso is that hyperthreading is enabled when XP is set up to ensure the multiprocessor version is installed. This is because the multiprocessor version has a greater performance overhead than the single CPU flavour although, in theory, the benefits of multiprocessing should overcome this.

Hyperthreading aims to utilise idle CPU time by ensuring that the processor is always doing something productive. At its most basic, applications divide their workload into a series of tasks (called threads) that need to be accomplished. These tasks are then sent to the processor. If you have two real processors available then you can send one task to one and the next to the other.

On a single-chip system, time is wasted if the processor starts work on a task but then has to wait for something else to happen before it can be completed. On a hyperthreaded system two tasks are sent to the CPU at one time. While the processor is waiting on task one it can be getting on with task two.

But it's not all plain sailing – badly written applications could take longer to run on a hyperthreaded system than on a single-processor machine. If, for example, one task was running in a loop, constantly checking to see if something has occurred (rather than pausing and waiting to be told), it can take up unnecessary CPU resources. As this task will be constantly interrupting other tasks on the single processor it could result in a performance decrease overall. Luckily it's a relatively easy problem to fix and most applications won't be affected. Intel also supplies a set of tools for software developers to identify possible problems, though these should decrease once hyperthreading is widely available.



Quicken the pace

By Intel's figures the increase in performance could be anything up to 54 percent, but it depends on the apps you run and what you do. The biggest increases were shown during multitasking (running more than one program at the same time).

Hyperthreading is a nifty trick and the availability of real multiprocessor systems means software developers have long been programming with them in mind. Depending on your circumstances and the software you run, the results will vary, but for what is effectively a free increase in performance you can't complain. ■

behind the news

Flat-panels may be fast taking over from the bulky monitors on most of our desks, but there's a new technology on the block that promises lighter, slimmer brighter screens. Andrew Charlesworth welcomes in Oled displays

You may have only just got used to the idea that flat-panel LCDs (liquid crystal displays) are replacing conventional CRTs (cathode ray tubes) as computer monitors, but the technology that will replace LCDs is already in sight.

More than 50 companies are pouring money into researching and developing organic electroluminescence, also known as Oleds (organic light emitting diodes).

Those of us old enough to remember Sinclair digital watches and calculators will think we are familiar with LEDs – big red illuminated segments that could drain a couple of AA batteries in an hour or two if left on accidentally. But LEDs have moved on since then.

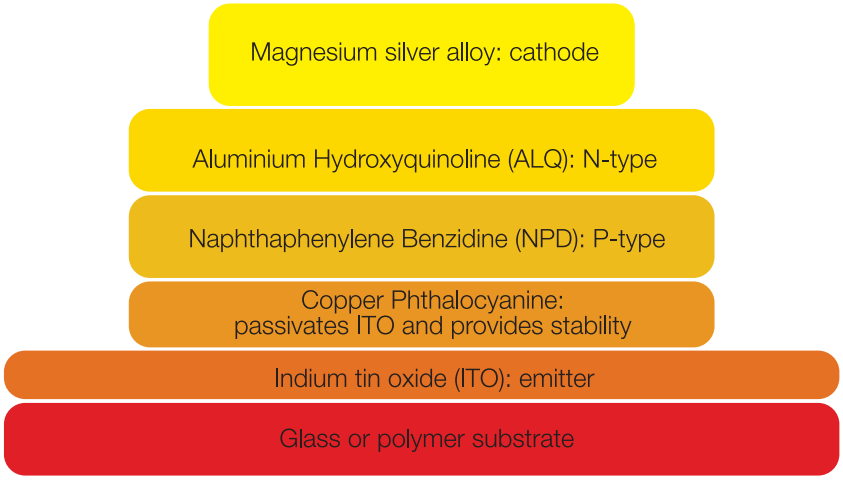
Small wonder

Oleds are tiny now – down to a pixel size of 0.1mm^2 – and their advantages over LCDs are many. They draw less current because they don't require a backlight, they are brighter, have a higher contrast, can keep up with video and have a greater viewing angle.

The low voltage requirements and high brightness make Oleds the obvious candidate for mobile applications – next-generation mobile phones, PDAs (personal digital assistants), handheld games consoles, digital camcorders and digital-still cameras – all of which require a screen that is bright for outdoor use, but has a low drain on battery power.

Furthermore, Oleds can be made on plastic – LCDs need glass – which means an Oled display will be lighter and less likely to shatter if you drop your mobile phone on a tiled floor, for instance.

But – and there's always a but with new technology – Oleds do suffer from two major drawbacks: the size of screen that can be usefully and economically constructed and their lifespan.



↑ Oleds have a layer of organic material. When a current is passed through the stack, it emits light

The light that burns twice as bright…

The problem with lifespan is inherent in the luminescent materials used to make Oleds (see *How Oleds shine,* below). The first LEDs were red or yellow for a reason: materials that shine red or yellow were and still are the easiest to make and are stable for longer. Blue LEDs weren't commercially available until the mid-1980s.

The same goes for Oleds. A small monochrome display using red Oleds – say, for a mobile phone – can be made to last for up to 40,000 hours. Indeed monochrome Oleds are already in use in mobile phones in South Korea. But in a full-colour screen the blue and white pigments will fade after just 5,000 hours.

If you keep your phone on for 15 hours a day, 5,000 hours only equates to about a year's use. Naturally the companies involved in developing Oled displays are working hard to overcome this limitation.

Little coverage

Size is the other limitation. Mass production of monochrome 2in screens for mobile phones or digital cameras is one thing, but making a TV-grade full-colour screen of more than 8in across is still at least three years away, according to the companies that have invested most in developing them, and sceptics say it will be five years of more before they are ready to compete with LCDs.

However, in May this year, at the Society for Information Display conference in Boston, Toshiba showed a 17in Oled display. It was in a glass case, unavailable for close inspection, and Toshiba officials said they were nowhere near putting it into production. But it still blew away the conference delegates. ■

How Oleds shine

LEDs (light emitting diodes) use semiconductor materials, such as gallium phosphide, that emit light when current is passed through them. But in 1987 Ching Tang and Steve van Slyke of Eastman Kodak discovered they could layer organic materials on a glass substrate which, when a current of about 5V was passed through the stack, would emit light. Kodak licenses Tang's and van Slyke's technique to a number of companies that are developing mass production Oleds.

behind the news

With PC sales in a slump and more users upgrading their existing systems, what do the key manufacturers believe the market requires to give it that much-needed boost and what form will the computers of the future take? Wendy Brewer finds out

↑← Brave new applications, such as the smart Orange house, are seen as the future of the PC, keeping it relevant, useful and therefore successful in the market place

"I am certain the next killer applications will rely heavily upon high processing power and the PC's diverse range of applications"

Neil Laver, Microsoft's Windows marketing manager

Despite flagging sales and persistent competition from newer, smaller, snazzier devices, industry insiders are convinced that the desktop PC has life in it yet. "The slump [in sales] is simply due to the economic climate," believes Neil Laver, Microsoft's Windows marketing manager.

Research from computer retailer PC World backs this up. It found that while 60 percent of UK homes already have a PC and the replacement cycle has lengthened slightly, the market for new machines hasn't disappeared. "A large percentage of customers are upgrading to new PCs as a replacement for, or to supplement, an older PC," said Peter Keenan, marketing director at PC World.

But Keenan also points out that as we become more IT savvy, instead of buying a new readymade PC we are becoming more adventurous about upgrading. This could also help account for a drop in sales of new machines. "The average PC owner is becoming more IT literate and we are seeing a growing trend in people upgrading individual components as required, such as RAM and graphics cards," said Keenan.

No news is bad news

Another problem is that PCs haven't done anything new for a while. Other devices such as PDAs (personal digital assistants) have become faster and smarter and Tablet PCs are the new big thing, leaving desktop PCs looking tired and old fashioned.

"Nothing new or exciting has happened in the PC market for ages," said Bruce Beckloff, director of marketing (Europe) at microprocessor manufacturer, ARM Holdings. "We've had no new major applications, just an extended functionality of those which already exist."

Beckloff also believes there has been a change in the way we judge PCs. Power is becoming less of an issue, with even the most basic of today's PCs capable of running applications at an acceptable rate.

This puts more pressure on the likes of Microsoft to develop new applications to entice us to buy. "Users are looking for something new, something they've never been able to do before, which is why they are turning their back on the PC," claims Beckloff.

Master race

But Microsoft and chipmaker Intel beg to differ, still believing speed is a key factor. "If 20 years ago someone had predicted that a home PC in 2002 would be capable of playing host to a virtual recording studio powerful enough to put multimillion pound facilities of the day to shame, they would have been declared hopelessly optimistic," said Intel marketing manager Mathias Raeck, "but it has happened."

"All these [sorts of] applications rely directly on processing power," added Microsoft's Laver.

Despite disagreements over what drives PC sales, most manufacturers are convinced that it is here to stay and that sales will pick up. However, where the boost in sales will come from is still up for debate. "It is impossible to predict what the next killer applications will be. Voice recognition perhaps. But whatever it is I am certain this will heavily rely upon high processing power and the PC's diverse range of applications, which other devices simply cannot offer," said Laver.

But Microsoft, Intel and even ARM agree that the PC of the future will be a more integrated device, becoming the central hub of the home, controlling the 'internet' house. "We are going to see the PC come into its own. It will be there to support the future house," added Beckloff.

Analysts at Gartner research estimate that one billion new computers will be sold worldwide over the next six years. ■