INTEL is trying to convince you that the PC is catching up with the supercomputer. As DARREN YATES reports, there's still some way to go.

In 1971, **Intel** launched the world's first microprocessor, known as the **4004**. At the time, it was considered earth-shattering stuff and enough to send most Star Trek fans into a tailspin. Built with 2,300 transistors, it supported 46 8-bit instructions and ran at an amazing clock speed of 108kHz (or 0.108MHz).

Its first use was in the Busicom calculator.

Twenty-seven years down the track, **Intel** (www.**intel**.com) recently launched the Pentium II Xeon processor. It has 7.5 million transistors and runs with a clock speed of 400MHz. The 57 MMX (multimedia) instructions are alone more than the **4004** could handle.

Over that 27-year period, **Intel** has mainly targeted the home and small business desktop, allowing other vendors such as IBM, Hewlett-Packard and Digital to look after the serious Unix enterprise market. But the Pentium II Xeon processor - **Intel**'s first serious raid on Unix territory and enterprise computing - has convinced many analysts that the PC chipmaker has the goods to give the Unix world a shake.

What gives Xeon its added firepower over the more sedate Pentium II processors is its full-speed 1Mb secondary level cache memory, which acts like a turbo-booster, as well as its ability to address up to 64Gb of memory.

That's at the processor level.

At the machine level, **Intel** has introduced a new core-logic chipset, known as the 450NX.

Not only does it support up to four processors running at once, it also allows for what is known as clustering - connecting as many as eight multi-processor Pentium II Xeon servers to act as one single powerful server computer.

Now this is not new in high-end computing circles, but it is the first time we have seen anything like this happen to the X86 architecture and certainly the first time we've seen anything like this from **Intel**.

And with Microsoft's Windows NT increasingly building up its corporate market share, are we starting to see the Wintel platform reaching maturity? Unisys jumps aboard Enterprise server makers, such as Unisys and Silicon Graphics, believe **Intel** has reached that point. Unisys, which is transitioning its mainframe customers to the Wintel platform, has just released its first enterprise server systems based on Pentium II Xeon technology.

Forming part of its ClearPath range, the new LX5000-series servers run Microsoft Windows NT on **Intel** processors.

Previous ClearPath systems ran proprietary Unisys-design processors manufactured by IBM under Unix software.

The company is also planning to introduce an **Intel**-based architecture that will allow up to 32-way multi-processing.

The technology is known as cellular multi-processing, or CMP, and it will allow a Unisys server to run as a single 32-way multi-processor system or four independent 8-way servers. In addition, the servers will also be able to operate Windows NT and Unix independently, even in the same box.

The architecture is expected to arrive next year on Xeon and possibly Merced processor-based systems

(**Intel**'s coming 64-bit architecture), the year after with both Windows NT and UnixWare.

Sharon Matthews, general manager for application & tech- nology solutions at Unisys Australia, believes the Wintel platform offers a lower total cost of ownership in the enterprise arena.

"**Intel**'s Pentium II Xeon is offering excellent price versus performance, delivering more demanding applications with more users for more clients than ever before," Matthews said last week. SGI moves over to **Intel** Silicon Graphics (www.sgi.com) is another server and workstation vendor that has jumped ship for the **Intel** processor bandwagon.

The company that bought the troubled supercomputer builder Cray Research recently announced moves to drop long-range development on its MIPS processor range and will migrate across to Merced when it appears in 2000.

The MIPS R14000 processor running at 400MHz is likely to be the last of its kind and should appear mid-1999.

SGI will need to continue servicing its MIPS platform for some time to come, but the move has been forced by its own decision to move to the Wintel platform. 2001 is seen as the year to watch for SGI.

Despite being recognised as the company responsible for creating the dinosaur models for the movie Jurassic Park, SGI has suffered financially in recent times with its share price now down around the $US10 ($16.70) mark after a 1998-high in April of just over $US16. The company also reported a net loss of $US220 million in the fourth quarter to June 1998.

It is pinning its future on the success of **Intel** in the enterprise computing market over the coming three years. Is Merced the answer? That leads to the question of what is happening with Merced, **Intel**'s joint venture with Hewlett-Packard. Also known as the IA-64 project, Merced was set for release in late 1999 but has been put back to 2000.

There are some reports that **Intel** insiders believe that the second-generation Merced, known as McKinley, will be the one to watch for real high-power performance.

At this stage, you would have to be a brave punter to bet the house on Merced. Both it and Windows NT 5.0 are still untried and untested.

While it is clear that **Intel** is garnering crucial support from vendors such as SGI and Unisys, it will need to deliver close to schedule or fear casting a few seeds of doubt within the enterprise computing community.

As they say, the proof will be in the processing. Putting it into perspective So where does that leave **Intel**'s Xeon processor in the larger scheme of enterprise computing platforms at the present time? Does **Intel** represent the ultimate business-computing platform?

IBM (www.ibm.com.au) is successfully pushing its RS/6000 and S/390 server systems, based on its own PowerPC processor, and appears to be going from strength to strength.

PowerPC is built around a RISC (reduced instruction set computing) architecture rather than the CISC (complex instruction set computing) method employed by **Intel** in the Pentium II Xeon processor.

With IBM's plan to introduce copper technology and to push clock speeds past the 1,000MHz barrier, it would appear that **Intel** still has some way to go to reach the highest levels of performance - but it is fast approaching that level, at least in terms of overall cost. Supercomputers At the very top of the enterprise computing food-chain are the supercomputers. While names such as Cray have dominated this territory for a long time, IBM is making plenty of moves with its own SP2, an evolutionary extension of its RS/6000 series using an architecture known as POWER (Performance Optimised With Enhanced RISC).

The SP2 is a scalable, parallel version of the POWER architecture built around IBM's POWER2 processors.

An SP2 system consists of one or more SP2 frames, each containing between two and 16 multi-processor systems or nodes. A node is the SP2's basic building block and consists of a single P2SC processor or PowerPC

604e symmetrical multiprocessor (SMP), memory, expansion slots and storage devices. Fully configured, an SP2 system can handle up to 128 nodes. Performance While having plenty of processing power and nodes is important, at the end of the day, a corporation needs to look at the cost factor involved.

And when you look at the competing systems, you need to be able to work out the overall performance and the total cost of getting that performance.

The fastest-growing benchmark for this type of enterprise computing is coming from the Transaction Processing Performance Council or TPC (www.tpc.org).

The two current benchmark tests it uses are known as TPC-C and TPC-D. Along with these benchmarks, the derived cost per transaction gives you a pretty accurate guide as to the "bang for buck" of each system.

The main benchmark, TPC-C, simulates a complex environment where a population of terminal computers executes transactions against the database server under-test. The result is worked out as transactions per minute, or tpm. The TPC keeps a long list of benchmark results from major vendors and can be found at http://www.tpc.org/new-result/ c-results.idc

Using this benchmark, IBM's RS/6000SP returned a result of 57,053 tpm with a cost of $US147.40 per transaction. The test system, a Model 309, contained 96 PowerPC processors running at 200MHz feeding 24 terminal computers or clients, each running a single 233MHz PowerPC 604e processor.

The operating system was IBM's AIX 4.2.1 running Oracle8 database manager.

Compare that with Unisys's Aquanta QS/2 server, running quad Pentium II Xeon processors that benchmarked at 18,154 tpm with a cost per transaction of only $US25.49. That's about one-third the performance but only one-sixth of the cost.

The server was feeding three clients each with dual 300MHz Pentium II processors, while the operating system here was Microsoft Windows NT 4.0 Enterprise edition running SQL Server 7.0.

Compaq is also doing similar numbers with its ProLiant 7000, running quad Pentium II Xeon chips.

The top mark? That so far belongs to Compaq with its AlphaServer 8400.

Packing 96 Alpha 21164 processors screaming along at 612MHz, this unit scored a benchmark of 102,541 tpm - the only unit TPC has recorded as breaking the 100,000-barrier. The total system cost, fully configured, was quoted as a tick over $US14.3 million.

Despite the record-breaking power, when you work out the cost per transaction, it still comes out at just over $US139.

And that's where many are seeing the Pentium II Xeon processor being a big winner.

Its lower cost per transaction should see it continue to make serious inroads into enterprise computing. And it will drag Microsoft along with it.

With many Pentium II Xeon servers running Windows NT, it also gives Microsoft a leg-up into the world of enterprise computing.

At the moment, the only Pentium II Xeon servers on the market are single quad-based units. But with vendors such as Unisys working on architecture advancements such as CMP, platforms such as POWER and Alpha will need to continue being at the very top, when it comes to tpm ratings, in order to keep their advantage. Conclusion The Pentium II Xeon processor looks to be **Intel**'s first processor with sufficient firepower to make it in the enterprise-computing world.

Intel also has the market share and clout elsewhere to ensure that it competes well in the total cost of ownership stakes.

But it won't be until we start seeing clusters of Pentium II Xeon servers in the market-place that it will be able to fully take on the likes of Alpha and RS/6000.

My tip is that, when it happens, the cost of enterprise computing may fall dramatically.