



Growing Up with Pervasive

Pervasive.SQL™ 2000i

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Pervasive Software Inc.

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A GROWING BUSINESS

Mom n' Pop's Authentic Texas Irish Deli started with the typical database needs of a small business. Mom n' Pop's maintained several small Pervasive.SQL databases for keeping track of employees, inventory, contacts, and similar information. None of their databases was over 10 MB in size, and only a few people were ever accessing the data at one time. They had chosen Pervasive.SQL because it required no database administrators to maintain the databases and it allowed Mom n' Pop's to deploy their databases on both Netware and NT as their needs evolved.

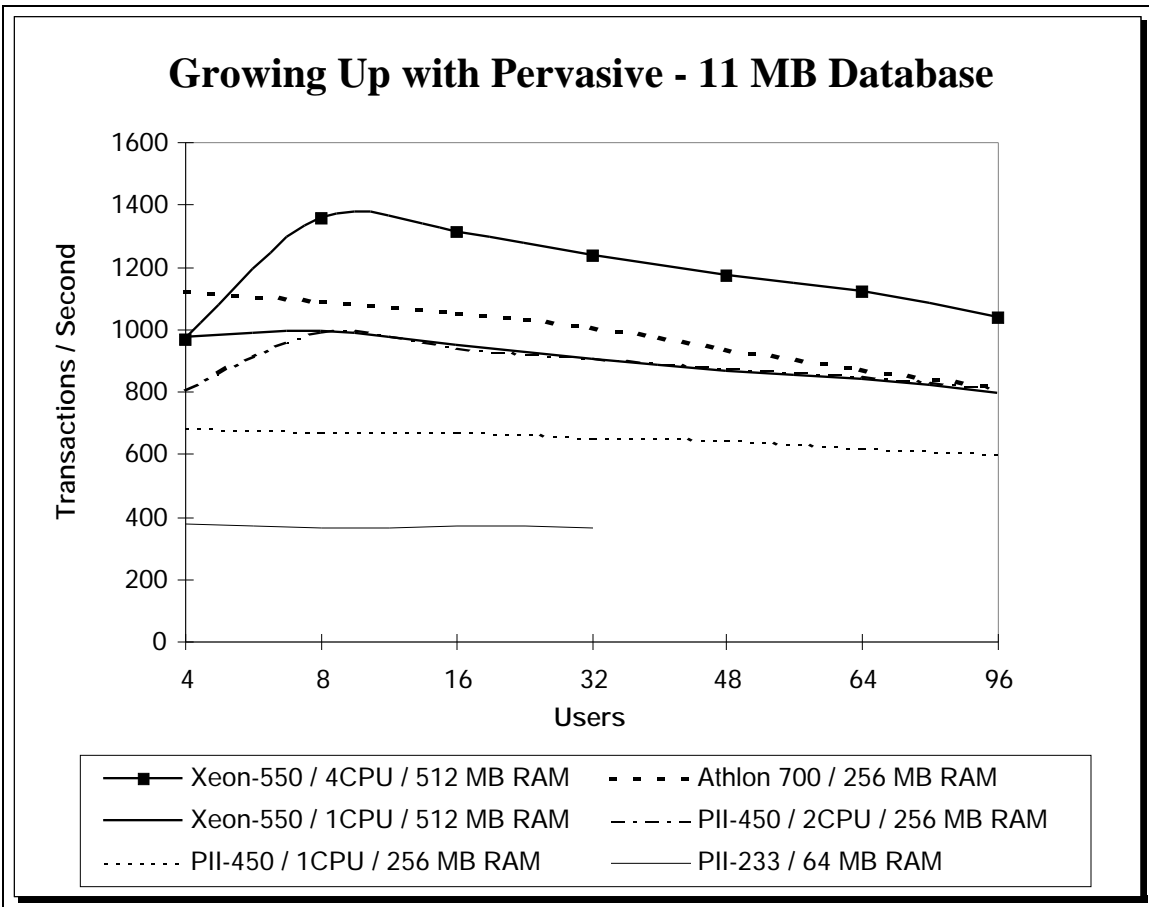
Then came success. As the Authentic Texas Irish Deli phenomenon began to grow, Mom n' Pop's opened 5 new locations, and shortly after, began selling franchises. In a mere two years, Mom n' Pop's was a statewide operation with dozens of locations, scores of employees, a very busy central warehouse and a new headquarters. All of a sudden, the 233 MHz Pentium IIs with their 64 MB of RAM were not nearly as responsive as they used to be. Some of Mom n' Pop's databases remained small, but several had grown to be fairly large, with up to a hundred people needing simultaneous access to the data. Pervasive.SQL handled its tasks easily and reliably as usual, but it was clearly time for some hardware upgrades.

Mom n' Pop didn't get this far by spending money unwisely; they asked their computer geek cousin Billy Bob to help them select their new hardware. Billy Bob had lots of geek friends and got access to some of their equipment. He brought over:

- A very fast 700 mHz Athlon system with 256 MB of RAM and inexpensive hard drives (built at the local corner computer shop for a very reasonable price)
- A moderately expensive brand-name 450 mHz Pentium II SMP server with 256 MB of RAM and fast conventional hard drives
- An expensive 550 MHz Pentium III Xeon system with 4 CPUs, 512 MB of RAM, and a RAID (Redundant Array of Inexpensive Disks) subsystem.

Billy Bob ran some tests to compare the performance of Mom n' Pop's various sized databases on these systems. Billy Bob used a test modeled after the Transaction Performance Council TPC-B test since he wanted to use a standards-based benchmark for fair comparisons. The TPC-B test measures performance in Transactions per Second (TPS); the more TPS, the better the performance.

Billy Bob started his testing with a relatively small but commonly accessed database. This database was small enough that it fit within the cache of all the systems tested. Several of Mom n' Pop's databases were unlikely to grow very large in the near future, so Billy Bob first ran tests against these small databases on the candidate computer systems. He came up with the following results (see graph on next page):



The brand-name Pentium II 450 MHz SMP system offered a good performance boost. Even with only one processor, it was much faster than their old 233 MHz Pentium, and with two processors it was more than twice as fast.

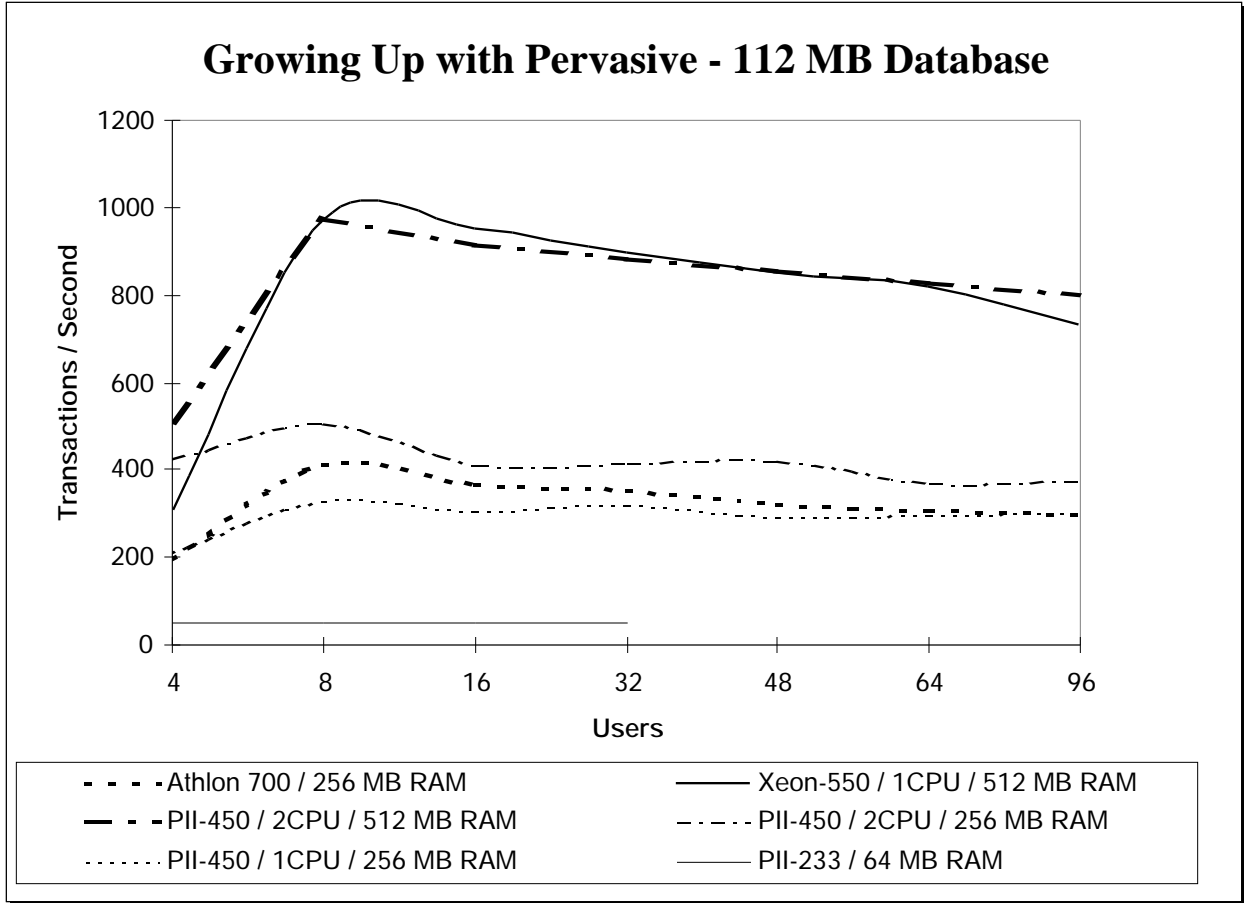
The single-processor Pentium III Xeon system matched the performance of the two-CPU Pentium II 450.

The 700 mHz Athlon was even faster, with its one processor, and the entire Athlon system cost less than half as much as the brand-name Pentium II system.

When Billy Bob put all 4 Xeon processors in the high-end brand-name system, it got much faster. This was good news. It meant that the Pervasive Software database scaled very well on an SMP box. But it was like killing a fly with a sledgehammer; the Xeon 550 Mhz system had a price tag about 8 times that of the Athlon, but wasn't 8 times as fast.

The Athlon, an inexpensive system with a fast processor, sure looked like a good candidate for handling the numerous small databases at Mom n' Pop's.

The next group of databases Billy Bob looked at in the Mom n' Pop's workplace ranged from 100 MB to over half a gig. Depending on the system, these databases could still run in memory on a system with a lot of RAM, so Billy Bob was not too surprised when his tests showed the following results:

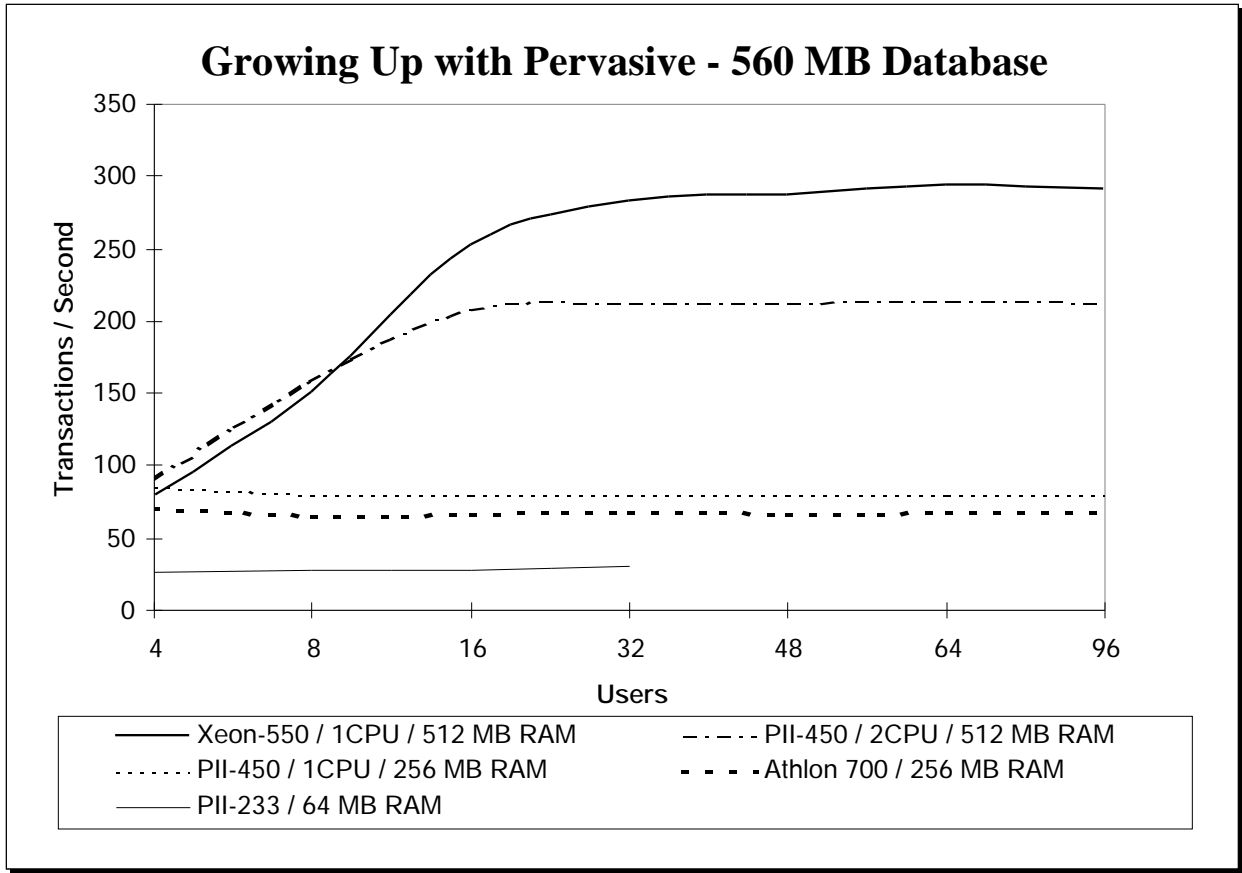


The single CPU Xeon 550 MHz system with 512 MB of RAM ran much faster than anything else during Billy Bob's first round of tests. With 512 MB of RAM, this system could hold the entire database in memory. If the whole database, or most of it, was in memory, then Pervasive.SQL could fetch the information from its database cache in RAM (always a much faster operation than fetching from even the fastest hard drive). So Billy Bob bumped up the memory in the less expensive Pentium II 450 MHz system from 256 MB to 512 MB and, as with the smaller database, the two CPU Pentium II 450 MHz system was now almost as fast as the single CPU Xeon 550 MHz system.

Billy Bob figured the Athlon was certainly a candidate for handling the database server chores for mid-size databases that were not likely to grow too much larger over the next couple of years. All things considered, adding more RAM is a much cheaper proposition than buying big, brand-name server. Unfortunately, the inexpensive motherboard in the Athlon system only had slots for three sticks of RAM, so Billy Bob couldn't boost the available RAM on this system enough to really make a big difference. Configuring the motherboard and getting it to run reliably with more RAM was very time-consuming, and Billy Bob never got the system to work reliably. He made a mental note to tell Mom n' Pop to avoid getting any systems that cannot easily be upgraded with more RAM. Sometimes, he thought, the brand-name equipment is better in terms of reliability and support.

ONWARD AND UPWARD

The upper end of the range of databases ran up to 560 MB, just over half a gig. When Billy Bob ran his tests he saw much the same results as on the other mid-size databases (see graph below):



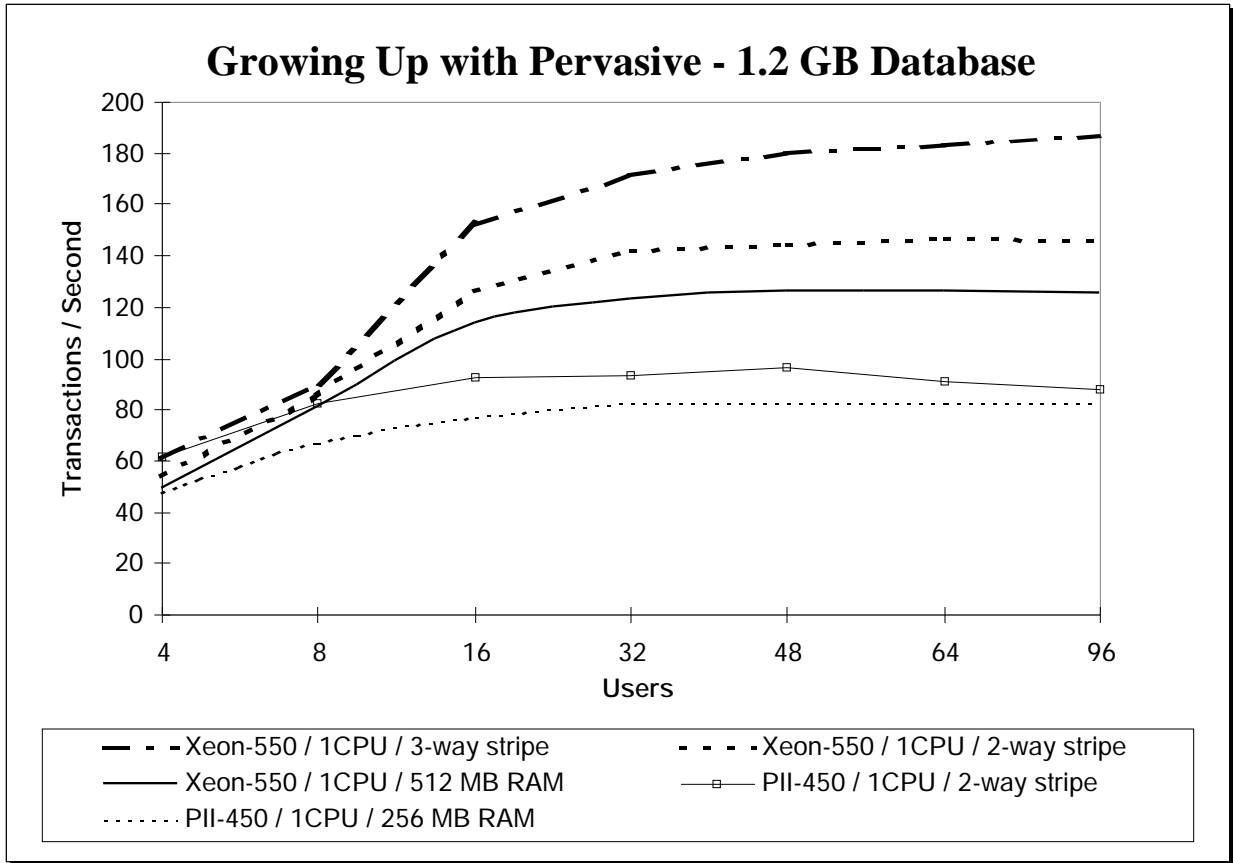
If the database is even mostly in memory, a system with more RAM is much faster than even the fastest system that has to use the hard disk all the time to retrieve data.

The less expensive brand-name 450 MHz system with its RAM increased to 512 MB looked pretty good. With fast, conventional, hard drives and some other nice features, it seemed like a worthy candidate for the larger mid-sized databases.

The Xeon 550 MHz system began to pull ahead with databases of this size. It not only had a slightly faster processor, but its RAID subsystem has superior performance characteristics. The extra durability and better warranty of the brand-name systems seemed to make them a cost-effective choice to handle the day-in/day-out workload of a mid-sized to large database—better choices than the corner computer shop can provide. Still, the high-end “enterprise” server’s performance advantage did not appear to justify its cost (over twice that of the Pentium II “workgroup” server).

IS BIGGER BETTER?

Finally, Billy Bob turned his attention to the large database at Mom n’ Pop’s. This database was a bit over a gigabyte in size, and growing. Even though more RAM would make an improvement in performance, adding enough additional RAM to hold the entire database in memory was not a cost-effective solution. Now that the hard drives would be in constant use, it would be necessary to find the fastest way to get this data in and out to disk. Billy Bob configured the RAID subsystem in the Xeon 550 MHz server with a 2-way stripe to get a large performance boost in disk I/O (input/output). The following chart shows what Billy Bob saw:



THE STARS AND STRIPES

The performance of the Xeon 550 MHz system operating against this I/O bound database was much better with Pervasive Software's Service Pack 2 running on a 2-way stripe* compared to running on a single disk, and it was faster still on a RAID 3-way stripe. This system setup is truly a star. Nothing else that Billy Bob could get his hands on could beat this server's performance on such a large database. The Pentium II's performance was made better by adding a 2-way software stripe with NT's disk administrator, but not enough to keep up with the Pentium III Xeon system with hardware RAID.

BILLY BOB'S CONCLUSIONS AND RECOMMENDATIONS

Billy Bob sat down with Mom n' Pop, told them in simple terms what he had seen, and made his recommendations:

- A few inexpensive, high-speed systems with at least 256 MB of RAM built at the local computer store for smaller databases.
- A good, solid brand-name server with a fast conventional disk subsystem and about 512 MB RAM for mid-sized databases. Mom n' Pop would need just two of these.
- A high-end brand-name system with a RAID subsystem to handle their server needs for their one really large database.

Armed with all this information, Mom n' Pop's Authentic Texas Irish Deli bought its equipment wisely and continues to flourish in the tough Texas Irish Deli industry.

Stay tuned as Billy Bob figures out how to help Mom n' Pop's make the transition to MomnPopsTXDeli.com!

**Footnote on striping and RAID.*

A Redundant Array of Inexpensive Disks (RAID) system creates an opportunity for greatly enhanced disk performance. By reading from and writing to installed disk drives in a manner that can be much more parallel than serial, a RAID controller can provide a dramatic performance boost on I/O bound systems. A RAID controller can additionally provide a redundant copy of your data in case of drive failure. For a technical discussion of RAID, check the links below:

<http://www.adaptec.com/technology/whitepapers/raid.html>

Windows NT also provides a software striping capability through the disk administrator. How efficiently it can provide a performance boost is somewhat dependent on CPU horsepower. NT Server can also do stripes with parity for fault tolerance.

<http://worldwindows.com/ntinfo/disk.htm>

For more information about Pervasive.SQL 2000i, pricing or support, please contact one of our sales offices or visit our web site at <http://www.pervasive.com> .

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