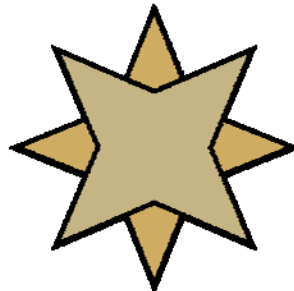


Checking Your Pervasive Server CPU Performance

A White Paper From

Goldstar Software Inc.



For more information, see our web site at
<http://www.goldstarsoftware.com>

Checking Your Pervasive Server CPU Performance

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The Pervasive PSQL database engine offers great performance over a wide variety of environments. The newer versions have been carefully tuned over the years to install and run much better out of the box than older versions. In most cases, you simply install the engine and you can enjoy screaming performance.

Recently, however, we have been seeing a scary trend in the database community. Sites are installing brand new servers, using the latest hardware, the latest CPU's, and the latest operating systems, and yet performance seems to be lagging behind older, often much less capable, systems. What's up with that?

What Is The Problem?

The problem in a nutshell is the new components themselves!

Several years ago, the race to getting faster servers meant getting servers with faster CPU's and a higher clock speed. It was easy to tell that a 2.0GHz CPU would outperform a 1.0GHz CPU – and provide around 2x the performance.

In more recent years, though, the push has been towards more cores, running at lower clock speeds. (The lower clock speeds help regulate the power requirements, and thus the heat dissipation required.) The use of multi-core CPU's is great when a server is heavily loaded, but if you are trying to optimize a single-threaded environment (i.e. one long-running process), then you won't see much gain, and in fact, you may get even poorer performance than an older box.

As CPU designers (Intel and AMD) have now started pushing the envelope in terms of the number of cores that they can fit in each package, they are now turning their efforts towards the power profile of the chips – and using technology to lower the power requirements of the hardware to “go green”. Again, this is a good thing, as it cuts the use of electrical power, and thus lowers the heat generated, enabling a further savings in cooling the data center as well.

So what could possibly be wrong with all of these advances? Simple – many people test “performance” by running a single process (like a long-running report) and timing how long it takes. All of these advances can make this process actually take longer on newer, more advanced hardware, than on older boxes!

How Can I Test My Server?

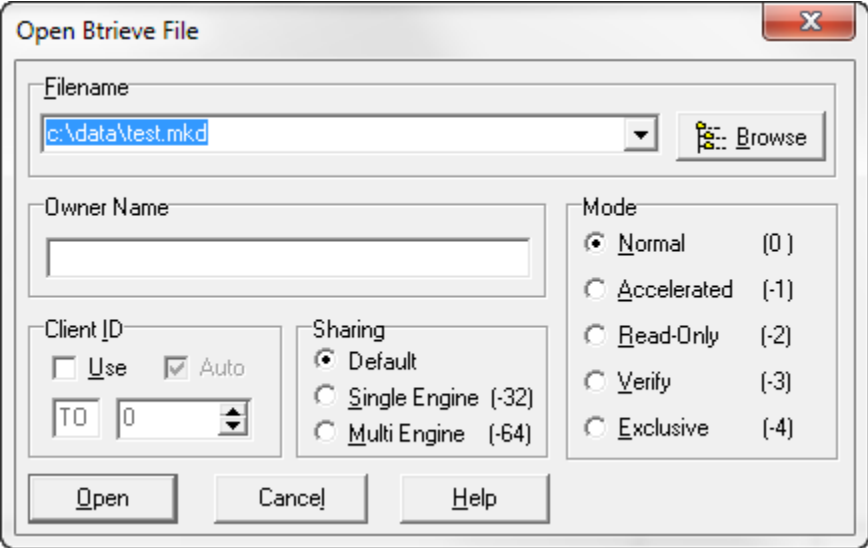
In a large, multi-user environment, the overall server performance is a complicated mix of CPU horsepower, memory usage, disk performance, network speed, and more. However, we've recently found that some problems (especially linear processes) can be boiled down to a single item – raw CPU power.

The concept behind this test is simple. We want to open up a Btrieve file from the server itself (in order to eliminate all networking issues), read ONE record from it (which will require one or more disk read operations), and then repeat the *exact same operation* 50000 times over again (which will eliminate all subsequent disk read operations). This process forces the database accesses to be handled from memory only, eliminating all other impacts on the server, including the network and disk I/O. (Note that this test is also valid on virtual servers, too!)

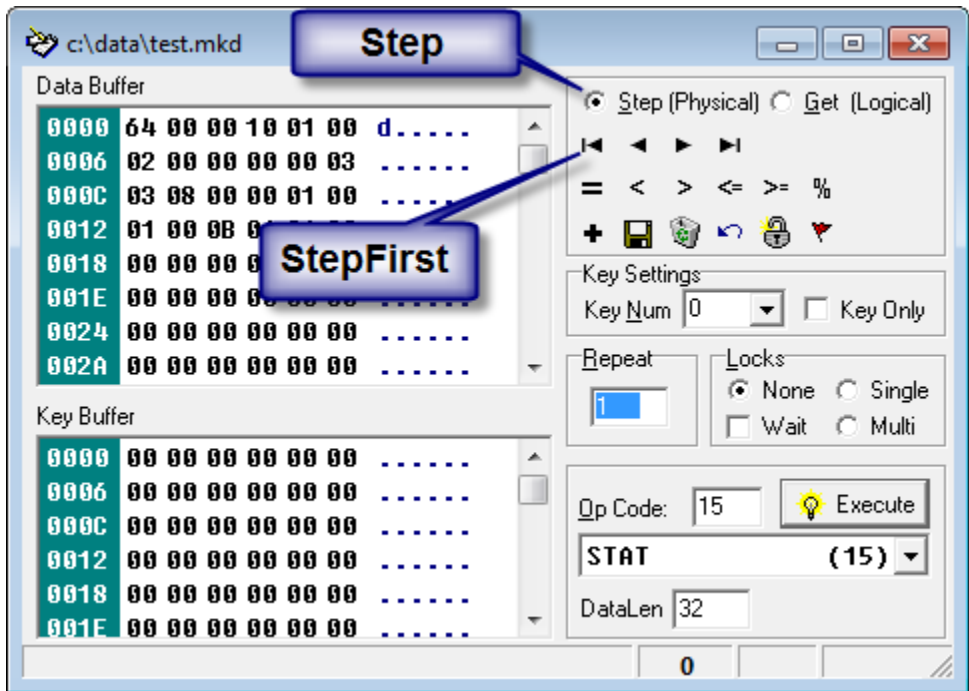
To run this test, first start up Pervasive’s **Function Executor**. You can do this from the PCC Tools menu, from the Start Menu, or by simply running **WBEXEC32** from any command prompt.



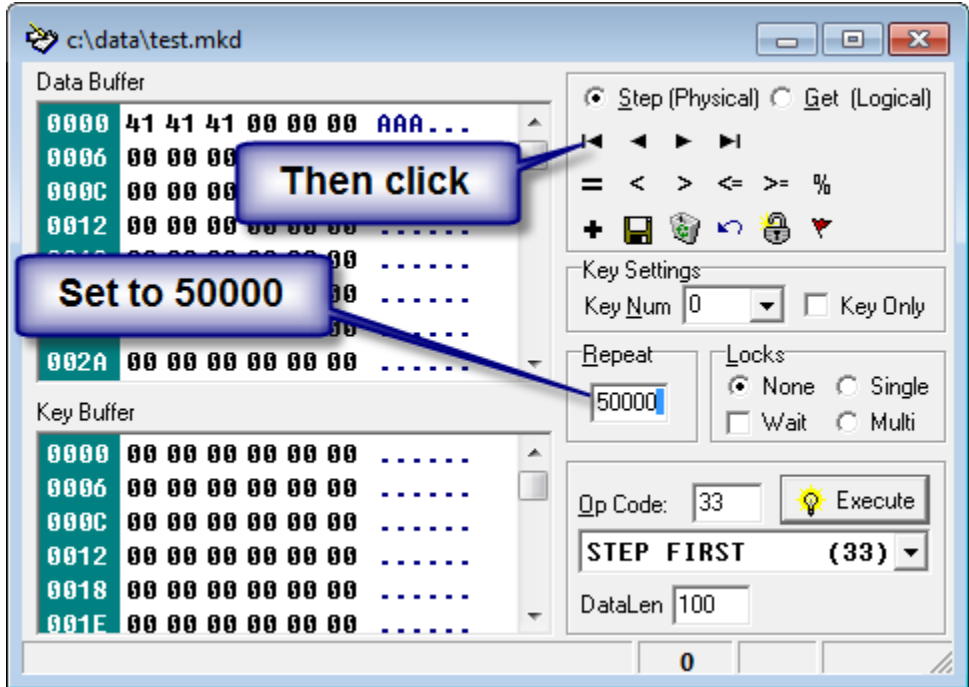
Next, select **File/Open** and get to the **Open Btrieve File** dialog box. Enter any data file name into the **Filename** box, or use the **Browse** button to select any Btrieve file.



Click **Open** to open the file, and you’ll see the data dialog box.

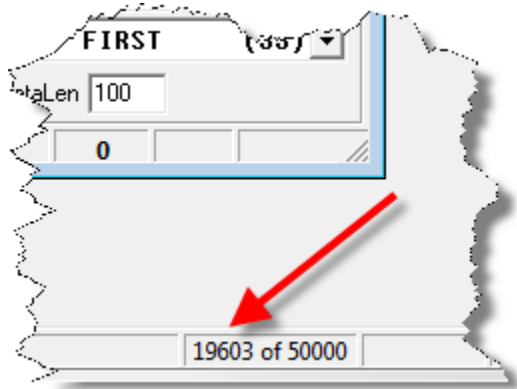


First, make sure that the **Step (Physical)** radio button is selected, then click on the **StepFirst** button. This reads data into the Data Buffer, and eliminates the need to do any further disk I/O activity for the duration of this test. If you get a Btrieve Status 9 from this, then you picked a file which has no records. Try a different file.



Then, change the **Repeat** value from 1 to 50000, and click on the **StepFirst** button again. The tool will now read the same record, 50000 times. While it is working, you will see a counter

at the bottom of the primary window that will increase until it hits 50,000, at which time the process is done.



Now, do it again, but this time get out your stopwatch and time the process. Record your results.

Interpreting Your Test Results

In our tests, we have seen a wide variety of performance results from this crude test, even working with a simple stopwatch by hand. Every file may be different, and some files may have more complicated “first” records than others, which will be especially true for compressed files, or those with variable length components. However, the relative performance between two servers in your own environment, especially when tested with the same file, can be very telling.

At one site, we observed a variety of timings for 50000 operations ranging from 2.97s to 13.6s on various servers. At another site complaining of very slow performance, we saw timings as high as 18 seconds! At a third site (OK, our offices), we saw a machine clocking in at 1.9 seconds. Where does your server fit into this spectrum? This wide variety of performance times is very unusual, because this test eliminates just about every physical factor that can impact performance. So again, we have to ask, what gives?

Adjust your CPU Performance Within the OS

Remember all of the new features provided by AMD and Intel in the area of power management? The newer CPU’s can not only put cores to sleep, but they can lower the clock speed when a system is not busy to cut power usage. Strangely, even though the manufacturers indicate that the system can instantly return to full speed, we are finding that this is NOT the case.


The first thing to try is to see if your power can be controlled by the operating system. Windows 7 and Windows 2008 have a **Power Options** control panel, and this is a great place to start.

Select a power plan

Power plans can help you maximize your computer's performance or conserve energy. Make a plan active by selecting it, or choose a plan and customize it by changing its power settings. [Tell me more about power plans](#)

Preferred plans

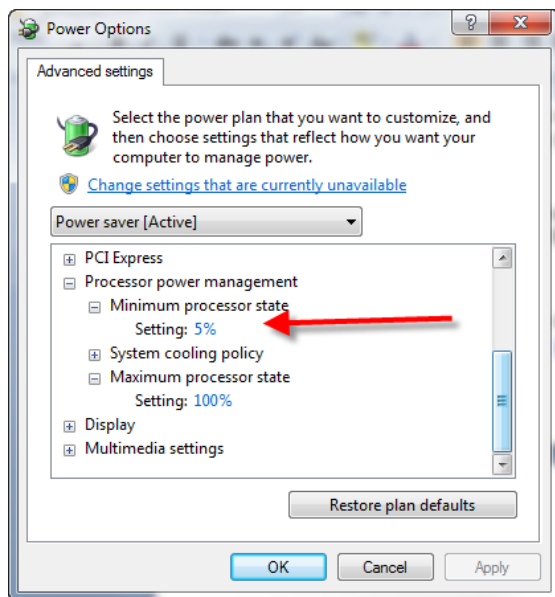
- Balanced (recommended)** [Change plan settings](#)
Automatically balances performance with energy consumption on capable hardware.
- High performance** [Change plan settings](#)
Favors performance, but may use more energy.

Hide additional plans 

- Power saver** [Change plan settings](#)
Saves energy by reducing your computer's performance where possible.

For example, on one test machine, changing the settings from **Power Saver** to **High Performance** decreased the runtime of this test from 3.0s to 1.8s – almost a 2x performance gain!

You can also drill down further into the **Change plan settings** dialog, then **select Change Advanced Power Settings**, and fine-tune these settings even more.



Try playing with a variety of the settings in this dialog, but start with the **Minimum Processor State**.

Remember, though, that as you increase performance, you'll likely increase power consumption, increase heat generation, and increase fan speed (and thus system noise) on systems with variable-speed fans.

What If I Cannot Change the OS Settings?

If you do not have these options, which will likely be the case if you have an older CPU, then you may not be able to leverage the OS tuning capabilities for the system performance. Instead, you may want to reboot the server, dig into the BIOS, and look around for related settings in there.

On an HP Server, we found a setting in the BIOS called the Power Profile that had to be set to Maximum Performance to get the best possible speed. More detailed information can be found on the HP white paper here:

<http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00502616/c00502616.pdf>

On an Intel white-box server, we could only find one option related to performance, and it was called EIST. This is short for Enhanced Intel SpeedStep Technology. Disabling this option provided a suitable jump in performance from 18s to 8.5s.

If in doubt, check with your motherboard manufacturer for more information before disabling things at random.

Another Test You Can Try

Another thing you can try is to download the utility called CPU-Z and run this to look at your CPU speeds. With this, you can easily swap between various speeds and monitor the impact on your perceived CPU performance.

Can I Get the Best of Both Worlds?

Do you often need your system to run as fast as possible, but you also care about the environment? Windows 7 users can try out a few different Sidebar gadget that offer a quick and easy way to manage your power profile on the fly – just click on the icon and change your profile.

One of these is called Power Scheme, and is available here:

<http://gallery.live.com/liveItemDetail.aspx?li=e0040b09-c1c8-4ad0-b2a4-a3efc8fa850f&bt=1&pl=1>

Is This Only an Issue with Pervasive?

Certainly not! Here's some other web sites which comment on the same issue:

<http://sqlserverperformance.wordpress.com/2010/02/22/power-plans-and-windows-server-2008-r2/>

<http://www.brentozar.com/archive/2010/10/sql-server-on-powersaving-cpus-not-so-fast/>

<http://www.sqlskills.com/BLOGS/PAUL/post/Are-your-CPU-s-running-slowly-Tool-tip-and-survey.aspx>

If you still have questions, [contact Goldstar Software](#) and let us work with you to help!

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