Solid State Drives Offer Larger Performance Gains

Questions? Call us at (855) 272-7638 and ask for the I.T. Team, or email itsupport@bsasoftware.com.

In recent years there have been two major advances in computer technology that dramatically affect the performance of BS&A's suite of applications. The first is the invention of solid state disk drives. The second is the multi-core processor. These two technologies represent performance improvements that have to be seen to be believed. As of the second quarter of 2010, multiple core CPUs are common, and SSDs are rare. This paper will discuss both and their relative impact on performance in the BS&A suite of applications.

The following link leads to a side-by-side video that illustrates the clear advantages of Solid State Drives as compared to legacy technology. The video shows a report that spins through approximately 38,000 Utility Billing History Records:

http://www.bsasoftware.com/Videos/SpeedTest/HistoryRegisterSpeedTest.html

Solid State Hard Drive

SSDs vs. Traditional Hard Drives

One of the last moving parts in a computer (other than fans) is the Hard disk drive. The purpose of these drives is to provide longer term storage of information; either while said information is not in use, or while the PC is off.

It is difficult to overstate the differences between solid state and traditional hard disk technology. While most industry advances are incremental improvements of existing technology, occasionally entirely new technology arises to supplant its predecessor. SSD technology is just such an advancement.

Traditional hard disk drives are a group of layered magnetic platters that spin and are read by a series of magnetic heads. In appearance they look like a small compact disk being read by what looks like a record needle. These disks (layered 3-4 deep, and read from the top and bottom) spin at a rate of 5,400-15,000 RPMs. Eventually (with dust, scratches, and demagnification) these disks fail.

By contrast, Solid State Drives are made of computer memory, and have no spinning disks. They are closely related to so-called thumb drives (used for portable data storage) or compact flash RAM (used in digital cameras). One theory holds that because they have no moving parts, they will last years longer before failure than standard drives. The truth is they are currently too new to know how long they will last.

Because SSDs have no moving parts they can withstand drops/shocks better than standard drives. This makes them an intriguing candidate for the laptop market in general.

SSD Performance

On a traditional hard drive, data is stored in a specific spot on the platter. Platters must spin and read heads must move before it can search out the specific data requested.

SSDs by nature do not have this latency, and thus read performances across the board. Traditional hard drives have data read rates around 94MB/sec and write rates of about 85MB/Sec. By comparison SSDs average around 170MB/sec Write and 240MB/sec read.

Windows 7 operating systems have been optimized to take advantage of SSDs; older operating systems have not. While read times tend to stay consistent across OS platforms, write times can be much slower on Windows Vista and XP.

SSD and BS&A Software

Although it is new technology, BS&A Software has tested and adopted SSDs within their network. Calculations and reports, which by their nature are more read intensive, benefit greatly from the lack of seek time and faster read rates.

It was not uncommon in testing to find reports ran 2x to 4x faster than on a standard disk system. One extreme case was re-indexing a large data set; the re-index went from 4+ hours to under .5 hour. This performance has been repeated and verified.

Multiple Core CPUs

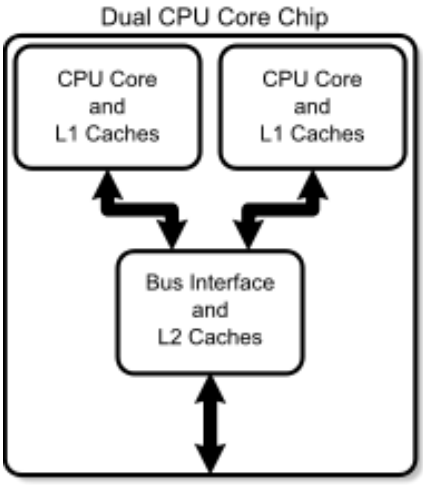
CPUs - the primary brain of the computer:

The Central Processing Unit (CPU) is the primary calculating chip in a computer. With hundreds of millions of transistors crammed into an area slightly larger than a quarter, the common way to measure speed among earlier processors was in MegaHertz or GigaHertz (MHz/GHz).

Things were fairly straightforward: a 900MHz processor was faster than a 700MHz processor. A 1.8 GHz CPU (1800MHz) was faster than a 1.2GHz CPU. There were complicating factors, but for the most part speed was a straight linear measure of these clock cycles.

Dual Core and Core2Duo

In an effort to gain extra performance, Intel began layering multiple CPUs on a single chip. These chips were originally called "Dual Core" and were available to purchase in high-end machines beginning in the 4th quarter of 2006.



The figure to the left displays the layering of the two CPU "cores" on a single die, with a single bus, or interface, to the rest of the computer. This technique makes the existence of the multiple cores virtually transparent to the operating system and software running on the machine.

Thus with the introduction of this style of chipset it became possible to have a 1.8GHz Dual Core CPU that was faster than a 2.4GHZ Single Core CPU. This complication made it difficult to express what minimum standards for a PC to run BS&A software are/should be.

The Core2Duo chip followed closely behind the Dual Core Chip. While it still only has the two cores, it does have superior L1 & L2 Cache and generally faster bus interfaces. Generally, the Core2Duo is a faster than its older relative, the dual core.

Quad Core and I3/I5/I7

More recently, Intel has introduced a Quad Core CPU. Similar to the Core2Duo, as the name indicates this chip contains 4 cores on a single chip. And as of the initial writing of this paper (second quarter 2010) a Core6 CPU is becoming regularly available in higher-end servers.

Currently the newest processors are labeled i3, i5, & i7. Despite the change in naming convention these are still multiple core CPUs with 2-4 cores and the virtual elimination of the front side bus bottle neck. In short, i3 processors outperform their older Core2Duo relatives, and have been quite comparable to the Quad Core Chips — even though they have only 2 cores. i7 processors are 4core chips, and as of Q2 2010, are the fastest chips regularly available in desktop computers.

Multi-Core and BS&A

Users who regularly keep more than one BS&A application open at the same time will get the most benefit out of this multi-core technology. These multi-taskers and power users will usually be the first to notice the additional speed.

With the rollout of BS&A Software's .Net suite of applications came a complete re-assessment of minimum PC and server requirements. While single core CPUs originally met minimum requirements, ***multi-core PCs are strongly recommended***.

The high level of integration of these new applications demands more from the processor than previous versions of the software did. Many customers are reporting dissatisfaction with performance on single core computers (generally these PCs are 4-6 years old.)

Conclusion

While the jury is still out on durability, and there is a price premium, BS&A felt the performance increases were too great to ignore. They have found great success so far in various higher-end servers and laptops.

Special i7 Processor machines with SSDs have been ordered to accommodate the large number of required data conversion.

Multi-Core Processors (especially the i7 Series) and SSDs provide for noticeably faster boot times, quicker calculations, and substantially quicker reports.

Upgrading technology always comes at an expense. Less obvious is the expense of lost productivity; saving money by using older machines can cost substantial amounts of time.

Dan Eggleston is the director of I.T. Right, a mid-Michigan based I.T. consulting firm that specializes in installing, configuring, and managing I.T. infrastructure for local government. In addition to consulting with over 500 local government customers, I.T. Right has been the I.T. consulting arm for BS&A Software since 1998.