

## TECH BRIEF:

# 32-BIT vs. 64-BIT APPLICATIONS

The debate rages within the micro-processor industry over the relative merits of 64-bit versus 32-bit processor architectures. In today's "bigger is better" world, the tendency is to assume that 64-bit architectures are superior to 32-bit architectures. But what does 64-bit really mean for most computer users?

One common myth is that a 64-bit architecture will inherently have twice the bandwidth of a comparable 32-bit architecture. While bandwidth is determined by the processor's data bus and register width, 32- and 64-bit in this case refer to the integers that can be handled in a single operation. A 64-bit architecture is capable of handling 64-bit integers in a single operation while a 32-bit architecture is limited to 32-bit integers in a single operation. This does not necessarily effect the rate at which the data may be moved into or out of the chip or the speed of this operation.

There are some advantages inherent to 64-bit architectures. Integer operations are often used to manipulate pointers into memory. 32-bit architectures are limited by 32-bit addresses which constrain their direct access capability to 4GB. 64-bit architectures with their larger integers have allowed the support of larger memory spaces without resorting to complicated seg-

menting schemes. However, very few applications actually require accessibility to data sets in excess 4GB. And the increased complexity of a 64-bit machine markedly increases the cost of implementation.

There is also the software side to this debate. 64-bit software is required

**Mainframe computers, which typically provide the basis for mainstream computing, have never substantiated the need for 64-bit architectures.**

to take full advantage of the new 64-bit architectures. Both the availability and integrity of operating system and application software is an issue. Historically, switching architectures raise users' performance expectations dramatically, while in reality the change leaves applications vendors scrambling to cover the holes customers discovered in their code. To this day in the PC market, most software applications are written for 16-bit or even 8-bit architectures even though 32-bit capable Windows 3.0 has been available for years.

Since one of the biggest advantages

of SPARC is the wide variety and profusion of software available to users, this creates a similar situation. Virtually all SPARC software in existence is written for the 32-bit architecture. It has been tested and improved over time and has matured to the point of stability. This includes not only the thousands of SPARC applications, but also the current versions of the most popular operating systems SunOS and Solaris. Most SPARC devotees are unwilling to sacrifice proven technology without any guarantee of increased performance or functionality.

Finally, there are many hardware and software improvements being made to today's technology that do not require migrating to a 64-bit architecture. Among these are multi-threaded software applications, and hardware improvements such as increased clock frequency, more aggressive 32-bit architectures and multiprocessing.



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