64-bit Computing Support, Does It Matter?

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It does not really matter if your applications do not need to access close to or more than 4GB of memory, the 32-bit memory address space limit. Usually user application can only access less than 4GB of memory space on a 32-bit system because certain amount of memory space has to be reserved for the kernel or OS. Even though workarounds such as the Physical Address Extension (PAE) and Address Windowing Extensions (AWE) are available to enable the use of more than 4GB memory space on a 32-bit system, however that usually comes with a performance cost as the memory access is through some kind of mapping process rather than direct access.

What kind of application will benefit from the 64-bit support?

- Application that needs to manipulate large date set. The need may arise due to the nature of the application or the requirement to improve accuracy with greater spacial and temporal resolution in numerical simulation. One good example is in weather or atmospheric simulation where greater spacial resolution will produce more precise prediction but at the same time will also increase the memory requirement. Another example is in molecular and quantum mechanical simulation where the memory requirement may grow exponentially as the size of the molecule or the number of atom studied increases.

- I/O bound application that can be performed in memory as disk I/O. Memory access is much faster than disk access.

Besides providing better scalability, a 64-bit system using the native capabilities of the CPU (e.g. the 64-bit arithmetic) will also help to increase the performance in handling larger data types.

64-bit computing is essential for applications that must make use of the increased scalability and performance of a 64-bit system. However, there is also a role for the 32-bit system to play as many computing needs can still be met with the more cost effective 32-bit solution.

In general, a 64-bit system supports both the 64-bit and 32-bit binaries. If you do not have the 64-bit requirements but for whatever reason still like to run your application on a 64-bit system, your application will perform better if compiled as a 32-bit binary (using the compiler option). When a 32-bit application is compiled for 64-bit binary, the binary will typically be larger than its 32-bit version. With larger binary and a given cache size available, the chance of cache misses is higher and hence performance may be affected.
At SVU, we provide both the 64-bit (Intel Itanium2, Compaq Alpha, HP PA-RISC and Sun UltraSPARC based) and 32-bit (Intel Xeon based) systems to meet the wide range of application requirements. Please check out our website at http://www.nus.edu.sg/comcen/svu/ or contact us at ccesvuhelp@nus.edu.sg if you like to know more about our facility.