CREDIT RISK ANALYSIS

Overview

ClearSpeed Technology is the world leader in enterprise-class acceleration technology for High Performance Computing (HPC). The ClearSpeed Accelerated Terascale Server (CATS) provides 64-bit performance of 1.152 TeraFLOPS in a 1U rack-mounted appliance. This is based on ClearSpeed's 192 core CSX700 processor, programmed in C.

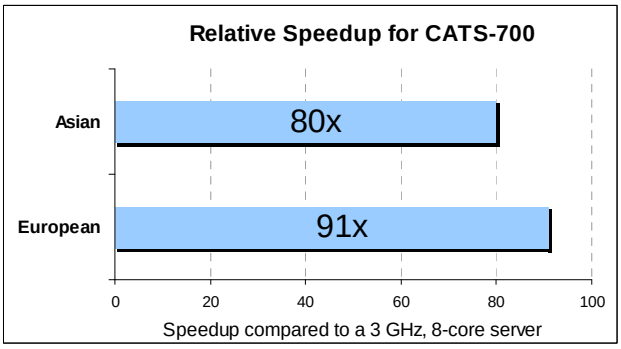
ClearSpeed has been working with a number of customers to accelerate their applications for credit risk analysis. Risk analysis of a portfolio of exposures can be very complex, often requiring multi-dimensional analysis and handling of complex relationships. Monte Carlo simulation is a tractable way to tackle these problems although it is computationally very expensive and hence requires large data centers with enormous capital and running costs.

Customer success story

A tier one Japanese bank chose ClearSpeed to accelerate their Monte Carlo-based credit risk analysis application. The application is regularly used to evaluate portfolios with tens of thousands of instruments across a very large number of scenarios. However, it was taking 50 hours to run on a desktop machine. This runtime meant that the analysis could not provide information for quick decisions and prohibited the use of the model for "what if" scenarios.

After working with ClearSpeed for a few weeks, the application was ported to run on ClearSpeed's CATS-700 accelerator. The same simulation now completes in approximately ten minutes on one CATS node, a speedup of 300x, and scales easily and linearly thanks to the simplicity of the programming model.

Faster



ClearSpeed's accelerators provide the fastest performance for 64 bit floating point processing; faster than Cell or GPU-based solutions. Monte Carlo methods are a particularly good fit for the CSX processor architecture and so very high levels of acceleration can be achieved.

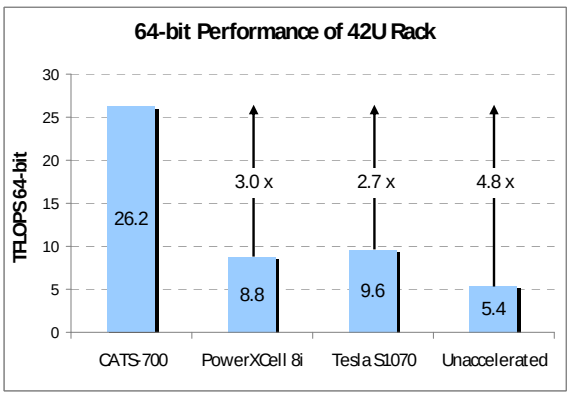
The results achieved with the full customer application are consistent with the performance of other examples including European and Asian option pricing which are often used as benchmarks for comparing systems and accelerator technologies. Example source code can be downloaded from ClearSpeed's web site (http://support.clearspeed.com/downloads/). This code is written to demonstrate the programming techniques for accelerating applications, rather than optimized for the best possible performance.

For these simple examples, a single CATS-700 unit is over 50 times faster than a server based on the latest Intel Core 2 Extreme 8 core, 3 GHz Xeon.

For a 42U rack with equal numbers of servers and accelerators, the CATS-700 solution is:

- 3x faster and 2.8x more power efficient than a system using IBM's latest 64-bit QS22 Cell blade
- 2.7x faster and 5x more power efficient than a system using Nvidia's latest 64-bit Tesla 1U GPU server

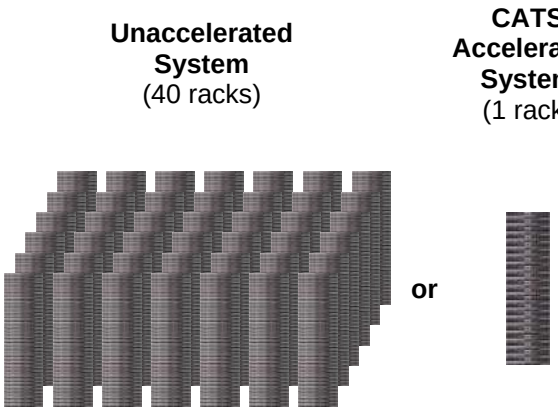
The power and efficiency advantage of the CATS-700 over Cell and Tesla result in running cost savings over three years for a single 42U rack of $103K and $234K respectively.



CLEARSPEED ACCELERATION FOR CREDIT RISK ANALYSIS

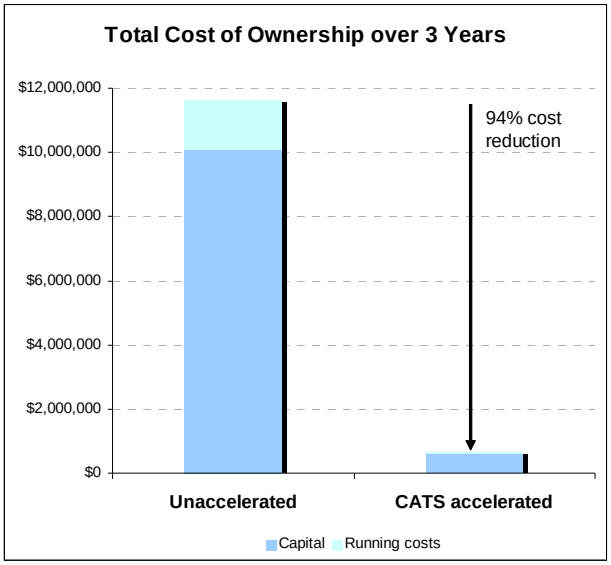
Smaller

One simple way of using CATS to accelerate a system is to add one CATS-700 node for each server. A single 42U rack configured this way will provide a massive increase in compute density: the same performance as over 40 racks of servers.



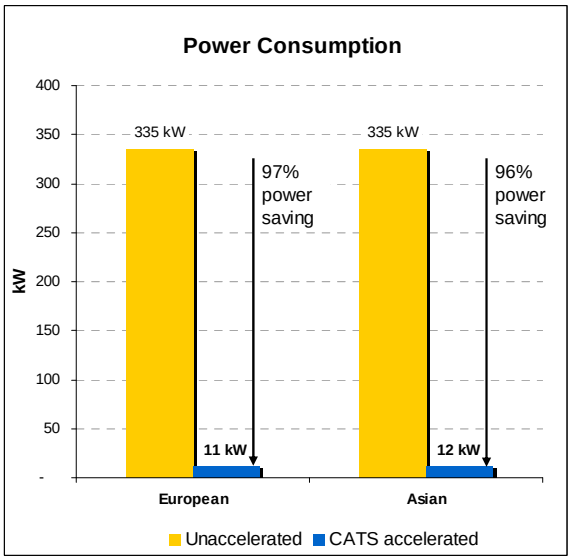
Cheaper

The initial capital outlay for the CATS accelerated system will be about $600K compared to $10M for the unaccelerated system. Because of the reduced power consumption and related infrastructure costs, the CATS-based system saves 96% of the running costs compared to an unaccelerated system with the same performance. The 3-year total cost of ownership (TCO) for the accelerated system will be about $643K compared with $11.6M for a system to achieve the same performance without acceleration.



Greener

Because of the power-efficient architecture of ClearSpeed's accelerators, the accelerated system will consume 3% of the power of an unaccelerated system with the same performance.



High Reliability

CATS-700 has been designed specifically for the rigorous demands of commercial computing environments, unlike GPU-based solutions which are prone to soft errors. CATS-700 includes many hardware reliability features, including ECC on all memories, both on-chip and off-chip, to detect and correct soft errors. It is the only accelerator to do so. These mechanisms enable CATS-700 to deliver an equivalent level of reliability already provided by current general purpose systems. In addition, a smaller, cooler system will be inherently more reliable than a large cluster.

For more information on the CATS-700 and other ClearSpeed products visit the ClearSpeed website: www.clearspeed.com