SiCortex

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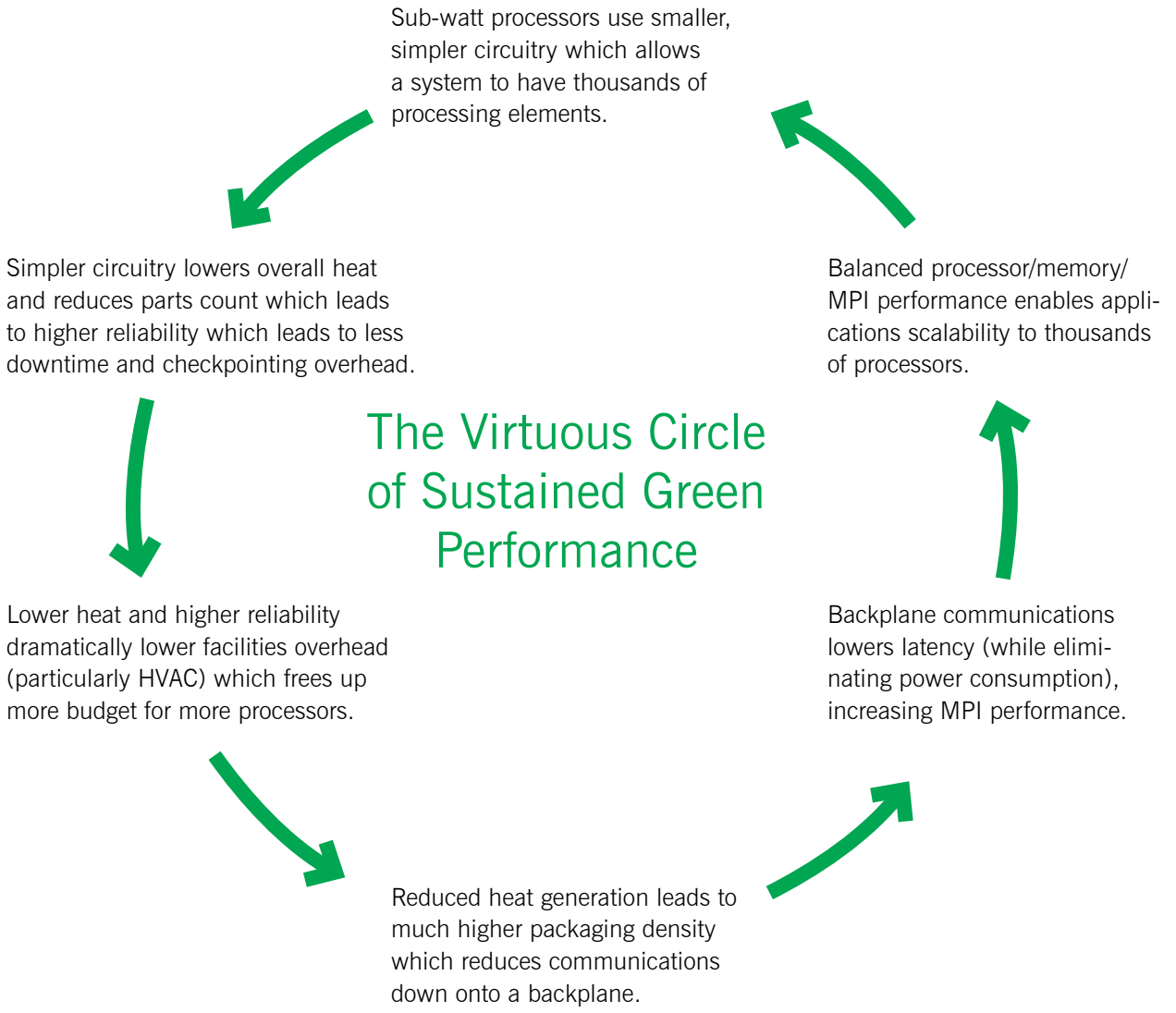
THE SICORTEX NEWSLETTER OF
HIGH PROCESSOR COUNT COMPUTING

It's Actually Easier Being Green

Green is an attitude, not a deprivation. Green is about getting it right at the beginning, not flinching at the end. In computer systems, green is as much about cool software as it is about cool hardware.

More than anything, green is about products that get out of their own way so their inherent efficiency and power can see the light of day. SiCortex is showing that, in computer systems, green performance is the most valuable performance of all.

The key to green performance is starting the hardware design in the right place, with ultra-low power processing elements, or cores. Even 10 watts per core is way too much to unlock the virtuous circle of benefits that unfolds when the power-per-processor is less than a watt. SiCortex 64-bit processing cores operate at just 600 milliwatts apiece.



The Virtuous Circle of Sustained Green Performance

Five Ways To Reduce the Footprint Of An HPC Application

Many applications developers assume that footprint is purely a hardware and facilities management variable. Not so. Software has a footprint, too. Software that makes wise use of the available hardware resources has a smaller footprint than software that uses these resources profligately. Data centers that measure and report the footprint of individual application runs take an important step toward getting the overall data center footprint down.

0. Minimize Runtime (duh)

No HPC user needs to be reminded to do this. The thirst for faster runs is insatiable, and developers work hard to make their codes run faster. There remain, however, options at runtime. Computing to a higher-than-needed accuracy, for example, increases runtime, perhaps to the third power, and hence increases footprint.

1. Eschew Peak

It has long been noted that "peak is meaningless," in that knowing the peak speed of a processor tells little about the sustained performance that an application will actually get. Peak is, however, a meaningful indicator of the amount of power that will be consumed during a program run. It is the sustained performance as a percent of peak that determines the footprint of an application. An application that runs at twice the percentage of peak on processors with half the peak has half the footprint. Or maybe a quarter the footprint, since power goes up more than linearly with clock speed.

2. Just Communicate

For the past ten years, Linux/MPI applications have been headed in the opposite direction, accepting additional arithmetic to avoid doing communications. A simple example: many applications recompute known values from scratch to avoid doing a lookup in a large table that requires communications. SiCortex systems can send individual values from tables as big as a terabyte in time comparable to a floating point operation. Applications that look up values have a correspondingly smaller footprint.

3. Practice Spin Control

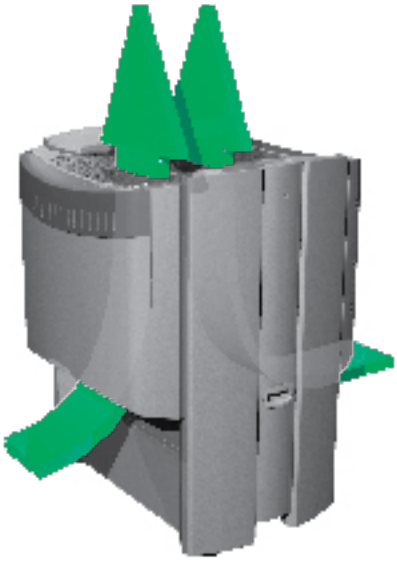
Modern HPC applications deal with enormous amounts of data that must be shared amongst large numbers of processors. Traditionally, this has meant large arrays of disk drives, often hundreds of them. Keeping all those disks spinning is the worst of all worlds: low access times and high energy use. Clusters with large amounts of main memory and the right access methods can keep all that data cached, reducing time-to-completion and lowering the disk energy footprint to boot.

4. Keep the Offense On the Field

When an application is moving toward completion, it is playing offense. When it stops to do a checkpoint to protect itself against unreliable hardware, it is playing defense, and bloating its footprint.

Perversely, the more energy a processor chip uses, the hotter and therefore the less reliable it is, forcing more frequent checkpoints. It is not unheard of for applications to spend half their run time checkpointing the other half.

Applications that run on inherently reliable hardware can potentially halve their footprint, and their time-to-completion, by keeping the offense on the field the whole game.



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SiCortex, the first company to engineer a cluster computer from the silicon up, is dedicated to the proliferation of multi-teraflop computing to a wide variety of users. The SiCortex approach represents a sea change in cluster computer design, where reduced energy consumption and increased performance are synergistic, not antagonistic.

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Peddle Power: MIT Cyclocross Team Promotes Alternative Energy, Low-Power Computing

Robert Buderi 12/11/07

As the red, white, and black uniforms of the MIT Cycling Team bobbed up and down before me early this afternoon, I couldn't help thinking: human abacus. Okay, the logic might be twisted (most folks here at Xconomy figure that's a given when I start writing), but there is method to my madness. The cyclists, 10 of them, had gathered in the lobby of MIT's Stata Center specifically to do some human-powered computing....

....the bikes were used to power machines made by SiCortex, of Maynard, MA, a venture-funded startup (investors include Flagship Ventures, Polaris Venture Partners, and Prism VentureWorks, along with Chevron and JK&B Capital) that specializes in low-powered supercomputers. To give you an idea of how low-powered, CEO John Mucci says the chip in his supercomputer, with six processors, uses about eight watts of power. The single-processor chip in my laptop, he told me, takes almost 100 watts. Ouch.

read the full story at http://www.xconomy.com/2007/12/11/peddle-power-mit-cyclocross-team-promotes-alternative-energy-low-power-computing/

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