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Ciara Technologies rethinks supercomputer design

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by Poonam Khanna

Montreal — Ciara Technologies says it wants to bring supercomputing to the masses and announced the launch of a supercomputer it says will re-engineer the way high-performance computing (HPC) clusters are designed.

Ciara also announced plans to make an HPC benchmarking centre available starting

in Q1 of 2005 for businesses, governments and academic institutions in need of computing power.

Ciara's VXR-3DT can scale from 16 up to 19,440 Intel Extended Memory 64 Technology Xeon processors, providing more than 140 teraflops of computing power, said Patrick Scateni, the VXRACK co-creator and director of business development for high-performance computing at Saint Laurent, Que.-based Ciara.

Each motherboard has two Xeon processors and an integrated switch. Two motherboards are paired together and the switch on each is connected to the four processors on the board, providing two routes to each processor. If one switch fails, the network fabric can still connect to the four processors through the second switch. Traditional supercomputers are "poorly designed," Scateni said. The hierarchical design of conventional HPC means if a switch breaks down, all of the processors that are connected to it become unavailable, he said.

"If I lose a switch at a point on the layer, I lose everything below it. That's not a great thing," he said.

HPC clusters also have unneeded components that can increase the chance of failure, he said. The 3DT, which runs on the Linux operating system and has native storage, no video, no USB, and no extra SCSI, Scateni said. It does, however, have two ports for feature expansion.

No common software

The computer uses commodity components, such as the Xeon processors and InfiniBand, keeping its cost low, Scateni said.

The company's goal is to offer "50 per cent of the speed at 20 per cent of the price," Scateni said.

The problem with tier-two HPC manufacturers is they are hardware manufacturers, and there's no common software to make the clusters run, said James Ballew, high performance computing architect at Dallas-based Raytheon. This means setting up an HPC cluster is a project that can take months, he said.

"The thing that made PCs happen really was the availability of a common software system — Microsoft's — that everybody could use. It was open to anybody that built a PC," he said. "The thing that's missing at this level is that there's a lot of pieces available, but there's no standard integrated software that these manufacturer companies could just

plug into. We saw this as something we needed to help make that happen."

Several processors co-operate to solve a problem and in a machine with a 3-D structure, you must take into account the topology of both the machine and the problem when you assign tasks to a processor, Ballew said.

For example, computational fluid dynamics problems are normally expressed either 2-D or 3-D. If you're splitting a problem up between two processors on a 2-D computer, you'd want to put pieces of the problem between two nearest neighbours to shorten the time it takes for them to communicate with each other, because some problems are tightly coupled, Ballew said.

Problems placed on a 3-D system such as Ciara's have to be reconfigured depending on their nature, Ballew said.

"What you do is rearrange the geometry of the problem to fit inside the geometry of the processing array."

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