Center for High-Performance & Reconfigurable Computing (CHREC)

A CISE-funded Center

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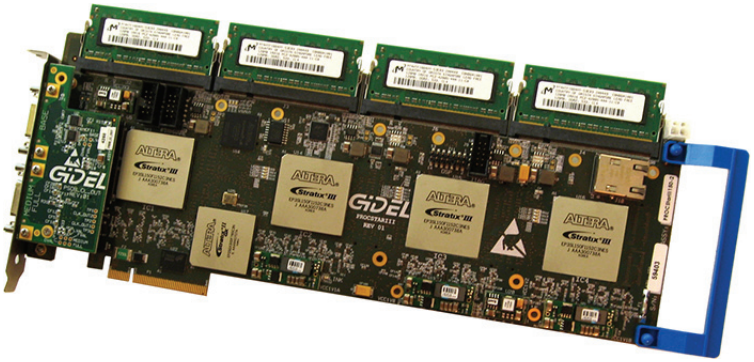
Novo-G: Most Powerful Reconfigurable Supercomputer

Novo-G reconfigurable supercomputer in the NSF CHREC Center at the University of Florida, with principal investigators Alan George (right) and Herman Lam (left).

It may be that the supercomputer, named Novo-G, developed at the Center for High-Performance Reconfigurable Computing (CHREC) is the world's fastest reconfigurable supercomputer; likely faster than the Japanese supercomputer touted as the world's most powerful. This innovative new form of supercomputing has a dramatically different internal structure than existing supercomputers. Most of the world's other computers feature microprocessors with fixed-logic hardware structures. All software applications for these systems must conform to these fixed structures. This can lead to a significant loss of speed and increases in energy consumption. By contrast, reconfigurable computers can adapt to match the unique needs of each application, which can lead to much faster speeds and less wasted energy. Later in 2011, CHREC researchers will double the reconfigurable capacity of Novo-G, an upgrade only requiring a modest increase in size, power, and cooling, unlike upgrades with conventional supercomputers. Novo-G offers computing advantages in areas such as genome research, cancer diagnosis and plant science; any area that requires analysis of large data sets. This technology was awarded the Alexander Schwarzkopf Prize for Technological Innovation by the I/UCRC Association in 2012.



One of Novo-G's 72 reconfigurable processor boards manufactured by GiDEL, each featuring four Altera reconfigurable devices. Both GiDEL and Altera are members of CHREC.

Economic Impact: Novo-G uses 192 reconfigurable processors rival the speed of the world's largest supercomputers at a tiny fraction of their cost, size, power, and cooling. Conventional supercomputers, some the size of a large building, can consume up to millions of watts of electrical power, generating massive amounts of heat, whereas Novo-G is about the size of two home refrigerators and consumes less than 8,000 watts. Much of science depends on computers; most depends on computers doing many computations extremely fast. Reconfigurable computing in general and Novo-G in particular are bringing innovative new concepts and technologies that are expected to have a major positive economic impact. Computing and related information technologies are key drivers in economic development. If scientists can do complex study calculations in 30 seconds, instead of hours, days or weeks, then it changes the way science is done. The benefits of such advances to science and to the nation are extremely difficult to quantify – but they will undoubtedly be substantial.

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