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Gaming Chips Head to Office

AMD, Nvidia Lead Shift
 To Powerful Processors
 In Business Servers, PCs

By **DON CLARK**
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Most businesses need computers. Some need really, really fast computers -- and could soon be seeing big gains by borrowing technology from the world of videogames.

The idea, backed by **Nvidia Corp.** and **Advanced Micro Devices Inc.**, is to apply chips that manage graphics and video on computer screens to more general number-crunching tasks. These graphics-processing units, known as GPUs, are getting rave reviews and threatening to take specialized jobs from the microprocessors used in personal computers and server systems.

Energy-exploration companies, for example, use rooms full of servers with conventional **Intel Corp.** and **AMD** microprocessors to sift through seismic data to analyze potential petroleum deposits. Some simulations that take weeks or months on such machines can be completed in 10% of the time with the aid of Nvidia GPUs, said Diderich Buch, chief executive officer of Headwave Inc., a Houston software specialist in the field.

"It's beautiful," he said. "We have companies that are testing it, and the response is just amazing."

Even fans concede that GPUs aren't good at every chore, and will usually work alongside conventional microprocessors. But they excel when calculations must be carried out repeatedly on massive sets of data, such as comparing photographs with images from security cameras at airports or public buildings.

Quantum3D Inc., of San Jose, Calif., has been using AMD's ATI GPUs and software from PeakStream Inc. to help U.S. government customers stitch together images from multiple security cameras, and from radar and laser detectors in aircraft.

"In some cases we are seeing a speedup of 100 to 1," said Ross Smith, Quantum3D's president. He sees a significant impact in applications such as unmanned aircraft, which could quickly compile and compress images to be sent for evaluation to commanders on the ground.

Companies such as Motorola Inc. have started to use Nvidia GPUs to help more quickly assess the impact of electromagnetic waves from cellphones on the human body, using software from companies that include Schmid & Partner Engineering AG, a Zurich company. By performing such tests more quickly, handset makers can reduce delays in introducing new products.


Another user is Wolfgang Kainz, an electrical engineer at the Food and Drug Administration's Center for Devices and Radiological Health, who makes computerized models of people and medical devices for such purposes as simulating the effects of magnetic resonance imaging scanners on patients who have pacemakers.

He estimates Nvidia's technology provides a tenfold speedup; some jobs that took three to four weeks can be completed in a day or so, he said. FDA researchers, who also study human interactions with devices such as metal detectors and antishiplifting systems, can devise better kinds of tests when they get results back that quickly, he said.

There are naysayers, especially at traditional microprocessor makers. Pat Gelsinger, a senior vice president who shares leadership of Intel's digital-enterprise group, said GPUs are notoriously difficult to program, and he argues that only a narrow technical audience would find it worth the trouble to do so. "It's very, very hard," Mr. Gelsinger said.

The shift to GPUs -- usually by installing circuit boards in desktop computers or using modified server systems -- reflects

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the fact that microprocessors are no longer improving fast enough for some users. In the 1990s, Intel and AMD boosted the performance of chips by increasing their frequency, or clock speed.

But such performance jumps have slowed, partly because customers resisted the resulting rise in power consumption. So Intel and AMD have recently boosted performance by putting two processors on each piece of silicon, and are racing to add more.

But GPU makers are far ahead in such parallel approaches. Nvidia's latest model, introduced in November, has 128 specialized processors, each capable of executing multiple threads. AMD, as a result of buying ATI Technologies Inc. last year, offers GPUs with 48 processors and should expand that number soon.

As for the issue of GPUs being difficult to program, GPU makers are trying to change that. Nvidia, of Santa Clara, Calif., last fall announced modifications to allow processors on its chips to work together in more flexible ways, as well as a development kit to help programmers.

Its GPUs already are being exploited by software companies such as Acceleware Corp., Calgary, Alberta, which helps apply the processing power to fields such as electromagnetic simulations, seismic analysis and medical imaging. PeakStream, a closely held company in Redwood Shores, Calif., offers a layer of software that helps users write software that takes advantage of AMD's GPUs.

One user experimenting with the combination is John Liechty, an associate professor of marketing and statistics at Pennsylvania State University, who consults with Wall Street firms. He sees "a lot of interest" in using GPUs to solve complex financial problems, such as making predictions about the price of derivative securities -- partly because the GPU makers can afford to improve their products because of revenue from the gaming business.

Supercomputer maker **Cray Inc.**, which has announced plans to offer machines with multiple kinds of chips for specific tasks, is considering adding GPUs to its list of options. "It's exciting technology," said Peter Ungaro, Cray's chief executive.

Write to Don Clark at don.clark@wsj.com¹

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(1) <mailto:don.clark@wsj.com>

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