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Defense Department Looks To Hybrid Supercomputers

By Gabriel Perna

The Defense Advanced Research Projects Agency (DARPA) recently announced it is initiating a program to develop a next generation supercomputer that's more powerful and efficient than its predecessors. And in order to do so, it's turning hybrid.

Hybrid in the supercomputing world means a processor that not only uses a typical central processing unit (CPU) but a graphics unit as well. Proof of DARPA's dedication to a hybrid supercomputer is its \$25 million contract to graphics processor NVIDIA to the lead a team of three organizations and six universities.

"We are essentially spearheading a curb processing or hybrid effort by combining the use of GPU and CPU. Each would take large parts of data and crunch through it simultaneously. DARPA is looking to get to the next big milestone without exceeding the budget, GPU is a part of it," said Andrew Humber, spokesperson for NVIDIA.

DARPA is calling the initiative the Ubiquitous High Performance Computing (UHPC) program. Its aim is to design a supercomputer that can compute at an exascale level and support the next generation of Department of Defense systems by 2018. At one-quintillion calculations per second, an exascale supercomputer would be one thousand times faster than today's petascale supercomputers. However, the UHPC has aimed at finding an efficient way of doing this.

"The technology we have today will not get us an efficient solution. The scale is not feasible, it would be acres of computer infrastructure and a disproportionate amount of power. Companies have to figure out how to reach the next level of performance without going overboard in cost, budget and space," Humber said.

NVIDIA and one of its competitors, Intel, which DARPA also named as a prototype developer for UHPC, have both explored using GPUs in a hybrid processing unit. Humber says NVIDIA has explored this option with several industries that process lots of data including oil and gas, complication finance and several bioscience research fields.

Steve Scott, chief technical officer at Cray Inc., one of the organizations NVIDIA is teaming with, says the GPUs NVIDIA offers makes processing energy efficient. He says Cray is excited to work with NVIDIA to improve the supercomputer potentially using a hybrid GPU and CPU processor.

"We're teaming with NVIDIA to provide a holistic perspective from programming tools, processors, interconnects to the whole software stacks," Scott said.