

Army supercomputing center signals growth in Soldier protection solutions

U.S. Army

ABERDEEN PROVING GROUND, Md. (June 13, 2013) -- Supercomputers Army Research Laboratory engineers rely on to influence the direction of future armor solutions and other unprecedented capabilities for the Soldier moved into a space large enough to house five supercomputers each with 4,000 to 20,000 processors each. In the next four years, the center will quadruple its computing capacity.

Sen. Ben Cardin (D-Md.) vowed continued congressional support during his remarks at the ARL Supercomputing Research Center ribbon cutting and open house here today. His visit comes on the heels of a national cyber security dialogue with China during a recent congressional visit there.

"Cyber security work done here is critically important to our national security," Cardin said.

Army researchers use the center's supercomputing systems, also known as high performance computers, to design and develop military technologies, such as future armor systems and other unprecedented capabilities for the Soldier.

The center will provide key enabling computational technologies in support of ARL's cyber security collaboration research alliance with academia, industry and other government research organizations to develop a fundamental understanding of cyber phenomena, including aspects of human attackers, cyber defenders and end users, so that fundamental laws, theories, and theoretically grounded and empirically validated models can be applied to a broad range of Army domains, applications and environments.

ARL Director Dr. Thomas Russell's said the role laboratory researchers played in the modern computer age is part of the basic research laboratory's historical contributions in hardware, software, advanced networking and computational science research.

"If we look back to 1992 and the state of computing then compared to today, we can only imagine what computational capability the future will bring that will take discovery and innovation to heights yet unseen," Russell said.

The new facility has over 20,000 square foot of supercomputing room space, which will house up to six large supercomputing systems by fiscal 2016.

Until recently, older buildings that housed these supercomputers, including a former horse stable, were "ill-equipped to hold computational resources" for the kinds of "transformational technology" discovered and created at APG, said Col. Gregory R.

McClinton, APG garrison commander.

The center holds two machines in the top 100 fastest computers in the world. The IBM iDataPlex 'Pershing' and 'Hercules' systems are the 62nd and 81st fastest computers in the world, respectively. In total, the center will have a cumulative computational capability of more than 1.2 petaflops of processing power. That's 1,200,000,000,000,000 floating point operations per second. By 2016, the center's capacity will grow to 4.8 petaflops.

That kind of processing power enables the kinds of simulations and calculations that were difficult -- and sometimes impossible -- to realize before HPC, said David Kleponis, who leads the Passive Hybrid Armor Team within ARL's Multi-Threat Armor Branch.

"Armor design is a product of the knowledge we gain from a scientific and engineering process," which includes high performance computing," Kleponis said. "This knowledge is greatly enhanced by HPC and is gained by observing processes that occur in microseconds, namely how armor actively disrupts and disperses a penetrator, like an improvised explosive device, for example. The insight we gain through computation is a multi-dimensional view inside very complex and violent physical events so we can learn from those observations and design very efficient armor solutions which ultimately save lives."

With HPCs, research engineers can "see inside a target, and inside threats" in unconventional, often brand new ways, he said.

"It's kind of like seeing inside a locked room without windows; it's like standing outside the door trying to see what's occurring inside that space," Kleponis said. "HPC unlocks our ability to see inside that space, inside the physics."

Such was the case with the Interim Frag Kit 6 and the MRAP expedient and spiral armor programs, each designed to defeat IEDs.

Had they used desktop computers, it would have taken research engineers 17 centuries to compute what HPCs did in about a month.

"In that time, ARL scientists and engineers used HPC to generate knowledge which led to the design of the armor system that was subsequently validated in a significantly reduced experimental effort because of the physics based simulations," Kleponis said.

Spinoffs from that project resulted in armors for route clearance vehicles including Husky, Buffalo and RG31 and also launched the MRAP Expedient Armor Program (IED armor) and the MRAP Spiral Armor Program (IED armor) for the RG-33, IMG MaxxPro Plus and Caiman; and the quick reaction armor support (including development and analysis) to theater. He said all of these were supported by an equally intense computational effort.

"For all of the platforms ARL supports, we currently rely on modeling and simulation

Army supercomputing center signals growth in Soldier protection solutions

Published on Electronic Component News (<http://www.ecnmag.com>)

to provide this type of insight into the mechanisms that become armor on U.S. platforms. Each HPC simulation may easily be worth tens of costly traditional experiments which didn't have to be conducted because we had high performance computing capabilities," Kleponis said. "This invaluable tool results in highly efficient protection technologies, protecting and enabling the warfighter."

ARL is the largest user of the Supercomputing Research Center resources. Other APG-based organizations use the center. All RDECOM organizations, including those based at APG, have access to the center.

--

ARL is part of the U.S. Army Research, Development and Engineering Command, which has the mission to develop technology and engineering solutions for America's Soldiers.

RDECOM is a major subordinate command of the U.S. Army Materiel Command. AMC is the Army's premier provider of materiel readiness -- technology, acquisition support, materiel development, logistics power projection, and sustainment -- to the total force, across the spectrum of joint military operations. If a Soldier shoots it, drives it, flies it, wears it, eats it or communicates with it, AMC provides it.

Source URL (retrieved on 04/21/2015 - 6:24am):

<http://www.ecnmag.com/news/2013/06/army-supercomputing-center-signals-growth-soldier-protection-solutions>