USASMDC/ARSTAT

Future Warfare Center

Simulation Center

Summary

- Major command R&D facility for space and missile defense design and analysis
- Stable and reliable computational facility
- Extensive high performance computing capability for space and missile defense designers/analysts
- Network and communication engineering subject matter expertise
- Software engineering and development support staff
- Support to USASMDC/ARSTAT joint research and experimentation
- Support to Army and DoD analytical studies, distributed exercises and experiments

The Simulation Center, or SimCtr, is a Laboratory of Laboratories, with leading-edge high performance computing assets supporting large-scale processing requirements of the space, high altitude and missile defense research and development communities and other joint projects.

The SimCtr serves as one of USASMDC/ARSTAT's major research and development facilities for space and missile defense research design and analysis of complex missile defense systems with state-of-the-art computational, modeling and simulation resources. The SimCtr provides these services to the Missile Defense Agency and their program elements, the High Performance Computing Modernization Program and other joint activities. The SimCtr provides local and remote organizations with large-scale computational assets and access to high performance Department of Defense networks to meet customer mission requirements.

SimCtr
Simulation Center

Future Warfare Center

The Simulation Center was created by the Army's Ballistic Missile Defense Command (now the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command) in 1981 to provide shared government-furnished high performance computational assets needed to address the research, development, testing, and evaluation of missile systems and related technology. Direct relationships exist with the Program Executive Office for Missiles and Space, the Ground-based Midcourse Defense Joint Program Office, and U.S. Strategic Command.

In 1996, the SimCtr became a distributed center partner with the Department of Defense's High Performance Computing Modernization Program. The SimCtr distributed center resources support high performance computer projects and provide remote access via the Defense Research and Engineering Network. In 2010, the SimCtr transitioned from a distributed resource center to an affiliated resource center and continues to provide users significant computational resources and high bandwidth connectivity.

The SimCtr offers the right high performance computational assets to the right users at the right time by:

- Providing the most appropriate hardware, software, network and communications tools and environments for each user program.
- Providing the engineering services required to acquire and integrate cost- and mission-effective computer architectures for user programs.
- Providing a secure, cost-effective computing environment that optimizes resources for analysis tasks common to the USASMDC/ARSTRAT community.

The vision of the SimCtr is to be the premier RDT&E center high performance computational support providing the tools, technologies, and expertise needed to realize the visions of both USASMDC/ARSTRAT and the Missile Defense Agency for delivering air, space, and missile defense capabilities.

Systems

The SimCtr provides several Linux systems. The three primary high performance computational systems include:

- A Cluster with 260 computational nodes resulting in more than 2,500 computational cores with a total of 8TB memory. It includes a closely coupled fabric of InfiniBand and Ethernet. This cluster continues to expand and is introducing nodes with 500GB memory each.
- A Cluster of four expanded computation nodes with a total 256 cores with 1TB memory. This cluster is expected to continue to expand and includes a closely coupled fabric of InfiniBand and Ethernet.
- A Cluster of 34 nodes with more than 270 cores totaling 1.5TB memory. This cluster is presently being tested for expanding the hardware.

Storage

The SimCtr provides both short- and long-term storage capability for scientific users. Short-term storage is provided by fault tolerant disk arrays accessible via the computing systems. Long-term storage is provided by a combination of hierarchical storage and high density tapes. Nearline storage is configurable for up to one petabyte, which is equal to one with 15 zeros.

Networks

The SimCtr network provides up to 10-Gigabit Ethernet for intra-center Ethernet connections and up to Optical Carrier 12 (622MB) on its Defense Research and Engineering Network link. Customer and other special networks are also supported. Other networks include the Secret DREN, Missile Defense Agency Classified Network, Battle Lab Collaborative Simulation Environment network, and Joint Mission Environment Test Capability network.

Visualization

Scientific visualization is provided with high performance workstations connected to the high performance computing servers with Gigabit speeds. Samples of software offered include: TecPlot, Intelligent Light FieldView, and Fast Light Toolkit.

Laboratory and Commercial Applications

Samples:

ALE3D – Lawrence Livermore National Laboratory
CARLOS – Electromagnetic Code Consortium – EMCC
CTH – Sandia National Laboratory
EADSIM V15, V16, V17 – US Army
GASP 3.x, GASP 4, GUST 4 – AeroSoft
TetrUSS – NASA Tetrahedral Unstructured Software System
XPatch, SAF – SAIC/DEMACO
The Mathworks MATLAB with several Toolkits
Message Passing Interface (MPI) and OpenMP

The SimCtr systems are continually upgraded based on user needs and requirements.

For more information, please contact:
USASMDC/ARSTRAT Public Affairs Office
P.O. Box 1500
Huntsville, AL 35807
Phone: 256-955-3887
Fax: 256-955-1214
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