

COSET-- High Performance Computing Lab

The High Performance Computing Center (TSU-HPCC) at TSU was established in 2008 to promote research and training on campus through integrating leading edge high performance computing and visualization for the faculty, staff and students of TSU (<http://coset.tsu.edu/hpcc>). TSU-HPCC provides consulting and assistance to campus researchers with experimental software and/or hardware needs and training in parallel and grid computing.



Funding:

- Dept. of Education, Title III
- National Science Foundation
- Welch Foundation

Resources:

- Specially designed and equipped 672 sqft. double floor data room
- A 205 V circuit with a total deliverable power of 88 kW
- Three 20-ton AC units to provide cooling
- Gas SAPPHIRE fire protection system
- Four racks with 64 nodes (blade computers)
- Each rack has independent 10 kW UPS power backup
- A total of 1016 computing cores
- A total of 892 GB of RAM memory
- Three 1GB/s Ethernet networks, two 10 GB/s Ethernet networks, one Infiniband fabric
- Eight “super-servers”, with dual 6-core Xeon processors and 4 Xeon Phi coprocessors each
- A total of 30 TB disk storage

Selected ongoing Projects:

- Classical Trajectory Monte Carlo simulation of proton and electron collisions with Rydberg atoms for cosmology and star genesis
- Quantum chemistry N-scaling large size system calculations
- Web hosting and web application programming
- Machine learning for food recognition
- Electronic structure calculations of Nitrogen-Vacancy defects in diamond to be used as pressure and temperature gauge
- Quantum chemistry study of metalo-organic catalysis of C sequestration
- Atomistic simulations of shock wave propagation in high energy density systems
- Advanced digital signal processing for vibration analysis in early detection of machinery failure
- Modeling of stray neutron production in proton radiotherapy using Monte Carlo simulations
- Phylogenetic tree reconstruction in bioinformatics
- Parallel massive data reduction
- Research on performant computation fluid dynamics with co-moving, and mixed boundaries
- Research on eigenvalue calculation of extremely large systems in quantum mechanics
- Training workshop in parallel computing