SC12 Student Cluster Challenge
Team Venus

A collaboration between University of the Pacific and LLNL along with vendor partner Appro

Lawrence Livermore National Laboratory is sponsoring Team Venus, an all women’s team from the University of the Pacific’s School of Engineering and Computer Science, to compete in the Student Cluster Challenge at SC12, an International Conference for High Performance Computing, in Salt Lake City, Utah in November 2012. In a non-stop 48-hour challenge, six team members will assemble a small cluster and race to demonstrate the greatest Linpack performance as well as sustained performance across four scientific HPC applications.

About Our Cluster

Hardware: The Team Venus cluster is built upon Appro’s GreenBlade™ technology, a modular, energy-efficient cluster building block platform optimized for HPC environments. We designed our cluster to deliver the most performance possible within the SCC-specified power budget of 26 amps.

**Team Venus Cluster Hardware Specifications**

<table>
<thead>
<tr>
<th>Subrack</th>
<th>Appro SR5110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodes</td>
<td>(8) Appro GBS12X</td>
</tr>
<tr>
<td>CPUs per Node</td>
<td>(2) Intel Xeon E5-2670 @ 2.6Ghz 166.4 GF/s peak performance</td>
</tr>
<tr>
<td>Memory per Node</td>
<td>64GB DDR3 @ 1600Mhz</td>
</tr>
<tr>
<td>Interconnect</td>
<td>QLogic 122001B Switch</td>
</tr>
<tr>
<td>Power Supplies</td>
<td>(4) 1620W high-efficiency PSUs</td>
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<tr>
<td>Peak Performance</td>
<td>2.6624 TF/s</td>
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Software: Our cluster runs LLNL’s HPC-optimized software distribution known as TOSS. TOSS uses RedHat Enterprise Linux 5 as the base operating system. This is augmented with cluster management tools, InfiniBand support, the SLURM resource manager, several versions of MPI, and a variety of compilers including GNU, Intel, and PGI.

Team Goals

- Serve as role models representing women in STEM
- Gain “real world” exposure to HPC scientific computing
- Establish HPC-focused curriculum at University of Pacific to expand career opportunities for future graduates

Team Members

Camila Carvajal Theresa Cruz Nichelle Dismer Caroline Dozsa Jess Dudoff Stephanie Lahnoan Phuong Pham Kathleen Shoga Justine Tang

Scientific HPC Applications

CAM: Community Atmosphere Model is the latest in a series of global atmosphere models developed for the weather and climate research communities.

LAMMPS: Large-Scale Atomic/Molecular Massively Parallel Simulator is a classical molecular dynamics code that models a group of particles in a liquid, solid, or gaseous state.

PFLOTRAN: Modeling multiscale-multiphase-multicomponent subsurface reactive flows using advanced computing

QMC PACK: Implements advanced Quantum Monte Carlo (QMC) algorithms for large-scale parallel computers.

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