Center for High-Performance Computing

The University of Southern California (USC) Center for High-Performance Computing (HPC) advances the university's mission by providing the infrastructure and support for research computing. Basic resources are available at no charge to USC researchers. Part of the USC Information Technology Services (ITS) department, HPC is housed within the ITS data center and is monitored 24x7 by ITS staff. Computing resources encompass compute cycles on either a 56-GB low-latency bandwidth Linux cluster (currently ranked 232nd in the world by TOP500 Supercomputer Sites, 12th Academic in the United States) or a 10-GB low-latency bandwidth Linux cluster and include limited, non user-restricted data, disk resources for the storage of raw research data and the resulting output from cluster-run jobs.

Each HCC cluster consists of nodes with either Infiniband FDR (56-GB) or Myricom 10-GB low-latency PCI cards, which are installed in racks. Each rack contains power distribution units to power the nodes, Ethernet switches to connect to the cluster's private Ethernet network, Cyclade console concentrators to manage each node, and cables connecting everything. The nodes in the 56-GB cluster are connected to I/O boards in a single Infiniband network enclosure. The nodes in the 10-GB cluster are connected to I/O boards in multiple Myricom network enclosures with cross connects between these low-latency network enclosures. The Ethernet enclosures contain I/O boards connecting nodes and switches, as well as cross-connects to other Ethernet enclosures. The disk arrays are presented to the cluster via network file systems (NFS) from multiple file servers. The arrays are part of a storage area network (SAN), which consists of multiple switches that connect the arrays to the file servers. All this hardware is managed, configured, and administrated by HPC staff, at no cost to USC researchers.

Researchers can install software packages or develop their own code within their project's allotted storage. HPC also provides various scientific software packages, as well as basic compilers and libraries, for use on the cluster. These include Amber, Gaussian, MATLAB, R, mpich, CUDA and SAS. We also collaborate with the developers of Globus and Pegasus for job workflow. These resources are available to HPC researchers at no cost.

HPC provides "condo" resources so that research projects purchase the resource while the resource remains part of the HPC cluster for the duration of the memorandum of understanding between the two parties. HPC is able to leverage vendors to provide resources at costs that typically are not available to research groups, based on the volume purchased. Condo prices include be the cost of the resource at the time of purchase and three years of vendor support and do not include any of the infrastructure cost required to incorporate those resources into the cluster. Infrastructure costs are covered by HPC. The condo node resources currently are configured for exclusive use by the condo owner. Node and storage resources must be vetted by HPC for support and compatibility purposes. HPC provides the quotes for condo resources.

HPC requires all researchers to annually apply for an account, even though they may have condo resources. Primary investigators must be USC faculty or students, and can have collaborators outside the university if the researcher obtains an iVIP account for them. The web page for applying for an account can be found at: http://hpcc.usc.edu/support/accounts/applying-for-a-hpcc-account/. Our web site, http://hpcc.usc.edu, provides additional information regarding login/head nodes, job submission and more.