High End Computing (HEC) help

The **High End Computing (HEC) Cluster** is a centrally-run service to support researchers and research students at Lancaster who require high performance and high throughput computing. This includes computing workloads with requirements that can't be met by the Interactive Unix Service (IUS) or desktop PCs.

The service combines what was the previously separately supported services for local high performance computing (HPC) users and the local Particle Physics research group (GridPP). The combined facility offers 8,800 cores, 40 TB of aggregate memory, 70TB of high performance filestore for general use and 4PB of medium performance filestore for GridPP data.

The cluster operating system is CentOS Linux, with job submission handled by Son of Grid Engine (SGE). The service supports a wide variety of third-party software including numerical packages, libraries and C and Fortran compilers.

Requests

- Page:Get access to the HEC

Troubleshooting

- Page:Compilation fail errors on the HEC
- Page:Secure file transfer fail errors on the HEC
- Page:Job fail errors on the HEC

Report another problem with the HEC

Using the HEC

Search

More information about how the HEC works

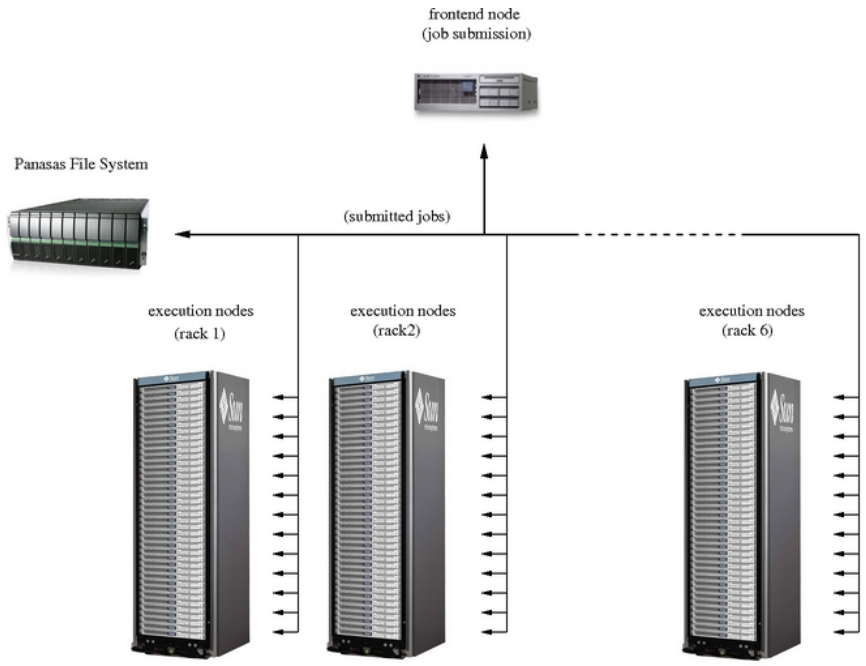
The HEC has three basic components:

a **login node**, where users login in to submit jobs;

the **compute nodes**, which run those jobs; and

dedicated file systems, which share user and other files across the cluster.

From the login node, users create a batch job script which describes the tasks their job(s) are to perform in a format similar to a unix shell script. The batch job is then submitted to the SGE job scheduler which will portion out user jobs to free compute nodes. Job submission commands can be supplemented with additional information, such as requests for specific amounts of memory (for large memory jobs), or multiple nodes (in the case of parallel jobs).



Hardware

Login node: The login node is a 6-core virtual machine emulating Haswell architecture, with 48GB of memory.

Compute nodes: The compute nodes consist 445 servers covering a variety of generations of Intel processor, offering a mixture of 16 cores (Ivy Bridge through to Broadwell architecture) or 40 cores (for Skylake). The memory size for a standard compute node is 4G per core, with a few nodes offering double that in order to support jobs with larger memory requirements. Compute node network interconnects are 10 Gbit/s low latency Ethernet.

File store: The primary file storage system is an 70TB Panasas Activestor Series 16 Storage Cluster. A series of Viglen HS424i storage nodes act as secondary file system providing 4PB of medium-performance filestore for the local GridPP initiative.

Software

A number of statistical and numerical packages and libraries are installed in addition to Fortran 90, C and C++ compilers. Most software is accessed via environment modules.

Get access to the HEC

- Learning Unix/Linux
  - Introduction to Linux by Lancaster University's Robin Long
  - Unix Tutorial (generic unix) - from the University of California at Berkeley
  - Search for Unix books using the Lancaster University Library OneSearch facility

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Logging in to the HEC

Using Filestore on the HEC

- Transferring files to the HEC
  - Transferring files to the HEC from the IUS or a Linux desktop
  - Transferring files to the HEC from a Windows PC
  - Transferring files to the HEC from luna or other smb-compliant services

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Using environment modules on the HEC

- Job Submissions on the HEC
  - Submitting jobs on the HEC
  - Monitoring jobs on the HEC

- Advanced Job Submissions
  - Running large memory jobs on the HEC
  - Submitting multiple similar jobs on the HEC
  - Requesting specific node types for jobs on the HEC

- Software available on the HEC
  - Using C and Fortran compilers on the HEC
  - Using the Ansys CFD package on the HEC
  - Using the COMSOL Multiphysics Package on the HEC
  - Using CP2K on the HEC
  - Using FFTW on the HEC
  - Using GROMACS on the HEC
  - Using the GNU Scientific Library (GSL) on the HEC
  - Using the LAMMPS molecular dynamics simulator on the HEC
  - Using the NAMD molecular dynamics simulator on the HEC
  - Using MATLAB on the HEC
  - Using the R Stats Package on the HEC
  - Using Stata on the HEC
  - Using StataMP on the HEC
  - Using Turbomole on the HEC

- Parallel jobs and programming on the HEC
  - Using the Message Passing Interface (MPI) on the HEC
  - Using OpenMP on the HEC

- Troubleshooting common problems encountered when using the HEC
  - Job fail errors on the HEC
  - Compilation fail errors on the HEC
  - Secure file transfer fail errors on the HEC

HEC service flyer (pdf)