

Software Set

to be installed on our cluster

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O/S:

Scientific Linux 4.5 64-bit

- ❑ An open source free Linux distribution
 - co-developed by Fermi National Accelerator Laboratory and the European Organization for Nuclear Research (CERN)
 - aims to be 100% compatible with and based on Red Hat Enterprise Linux
 - ❑ Derived from the free & open source Red Hat Enterprise Linux
 - made available by Red Hat, Inc.
 - under the terms and conditions of RHEL's EULA and the GNU General Public License
 - but not produced, maintained or supported by Red Hat
 - ❑ Web: <https://www.scientificlinux.org/>
 - ❑ Kernel with the Lustre file system patch
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File System: Lustre

- ❑ A parallel disk file system, generally, used for large scale cluster computing
 - ❑ The name Lustre is a mix of the words Linux and cluster
 - ❑ Aims to provide a scalable file system for clusters of tens of thousands of nodes with petabytes of storage capacity
 - ❑ Supporting
 - Scalable data serving through parallel data striping
 - Scalable meta data
 - Distributed/parallel operation
 - ❑ Available under the GNU GPL
 - ❑ Web: <https://www.lustre.org/>
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Authentication:

Lightweight Directory Access Protocol

- ❑ LDAP is an application protocol for querying and modifying directory services running over TCP/IP
 - ❑ A directory is a set of objects with similar attributes organized in a logical and hierarchical manner
 - ❑ LDAP is often used by other services for authentication due to this basic design
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Resource Manager: TORQUE

- ❑ Originally, it was Portable Batch System (PBS)
 - to allocate batch jobs among the available computing resources
 - often used in conjunction with cluster environments
 - ❑ Several spin-offs of this software
 - the overall architecture and command-line interface remain essentially the same
 - open source TORQUE is such a spin-off from Cluster Resources
 - ❑ Web: <http://www.clusterresources.com/>
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Job Scheduler: Maui

- ❑ An open source job scheduler for clusters and supercomputers
- ❑ An optimized, configurable tool capable of supporting an array of scheduling policies, dynamic priorities, reservations, and fairshare (load-balancing) capabilities
- ❑ Maintained by Cluster Resources
- ❑ Web: <http://www.clusterresources.com/>

Message-Passing: MPI

❑ OpenMPI

- An open source MPI-2 implementation that is developed and maintained by a consortium of academic, research, and industry partners
- Web: <http://www.open-mpi.org/>

❑ MVAPICH2

- MPI-2 over InfiniBand
 - currently supported by NSF, DOE Office of Science, Cisco Systems, Intel, Linux Networx, Mellanox, QLogic, Sun Microsystems, ...
 - Web: <http://mvapich.cse.ohio-state.edu/>
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Remote Direct Memory Access: OFED

- ❑ OpenFabrics Enterprise Distribution (OFED) suite 1.2.5
 - open-source software stack for InfiniBand
 - by OpenFabrics Alliance, a not-for-profit organization
 - ❑ OFED stack
 - Includes software drivers, core kernel code, middleware, and user-level interfaces
 - offers a range of standard protocols, incl. IPoIB, SDP, SRP, iSER, RDS and DAPL
 - supports many others, incl. various MPI implementations, many file systems such as Lustre over RDMA.
 - ❑ Web: <http://openfabrics.org/>
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Numerical Computing and Programming Environment: MatLab

- ❑ Allows easy
 - matrix manipulation,
 - plotting of functions and data,
 - implementation of algorithms,
 - creation of user interfaces, and
 - interfacing with programs in other languages
 - ❑ MatLab with
 - Image Processing Toolbox
 - Neural Network Toolbox
 - Genetic Algorithm and Direct Search Toolbox
 - Statistics Toolbox
 - Optimization Toolbox
 - Distributed Computing Toolbox
 - Distributed Computing Engine for 64 worker
 - ❑ Web: <http://www.mathworks.com/>
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Compilers and Programming Environment: C/C++, Fortran, Java

- ❑ Intel non-commercial
 - C/C++, Fortran
 - OpenMP, POSIX threads, Math Kernel Library, Integrated Performance Primitives, Vtune Performance Analyzer, Thread Checker, Threading Building Blocks, ...
 - Web: <http://www.intel.com/cd/software/products/asmo-na/eng/340679.htm>
 - ❑ GNU
 - C/C++, Fortran, ...
 - OpenMP, POSIX threads, ...
 - ❑ Java
 - ❑ Unified Parallel C
 - Web: <http://upc.gwu.edu/>
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