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OpenHPC Introduction

Adrian Reber

DevConf.cz 2018
January 28, Brno

OpenHPC: Motivation - 1

- Software installation common task at many HPC sites
- Same software is usually installed in multiple versions
- Multiple compilers
  - GCC
  - LLVM
  - Commercial Compilers
- Multiple Message Passing Interfaces (MPI) libraries
  - Open MPI
  - MPICH
  - MVAPICH2
  - Intel MPI

⇒ Each MPI compiled with each compiler (and each version)

OpenHPC: Motivation - 2

- `package-<compiler>-<mpi>`
- `fftw-gnu7-openmpi`
- `fftw-gnu7-mvapich2`
- `fftw-gnu6-mpich`
- ...
- Different permutation are made available via `environment modules` or similar mechanism

OpenHPC: Motivation - 3

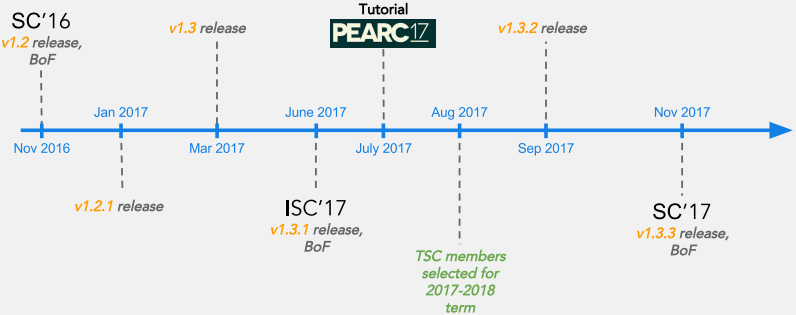
- Not only software installation
- Cluster provisioning
- Resource managers

OpenHPC: Mission and Vision

- **Mission**: to provide a reference collection of open-source HPC software components and best practices, lowering barriers to deployment, advancement, and use of modern HPC methods and tools.
- **Vision**: OpenHPC components and best practices will enable and accelerate innovation and discoveries by broadening access to state-of-the-art, open-source HPC methods and tools in a consistent environment, supported by a collaborative, worldwide community of HPC users, developers, researchers, administrators, and vendors.

OpenHPC: Current Project Members

OpenHPC: Project History



Building Blocks

Building Blocks: Pick and Choose

Building Blocks

- Important: OpenHPC provides building blocks
- Users can pick and choose exactly what they need
- x86_64 and aarch64
- CentOS and SLES

Software

- Compilers
- Message Passing Interface (MPI) libraries
- Numerical libraries
- I/O libraries
- Performance tools
- Software build and installation framework

Provisioning - Resource Manager

- Provisioning
  - Warewulf
  - xCAT
- Resource Manager
  - SLURM
  - PBS Professional
- Documentation

OpenHPC: Same Interface Everywhere

x86_64

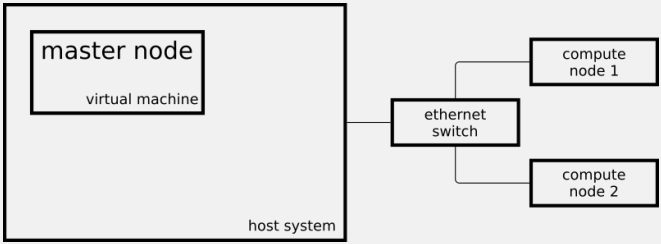
```
[train010sms001 ~]$ module avail

---------------------- /opt/ohpc/pub/moduledeps/gnu7-mpich ----------------------
   adios/1.11.0    mpiP/3.4.1             petsc/3.7.6        scorep/3.0
   boost/1.63.0    mumps/5.1.1            phdf5/1.10.0       sionlib/1.7.1
   fftw/3.3.6      netcdf-cxx/4.3.0       scalapack/2.0.2    superlu_dist/4.2
   hypre/2.11.1    netcdf-fortran/4.4.4   scalasca/2.3.1     tau/2.26.1
   imb/4.1         netcdf/4.4.1.1         scipy/0.19.0       trilinos/12.10.1

---------------------- /opt/ohpc/pub/moduledeps/gnu7 -----------------------
   R/3.3.3         metis/5.1.0        numpy/1.12.1       openmpi/1.10.7
   gsl/2.3         mpich/3.2    (L)   ocr/1.0.1          pdtoolkit/3.23
   hdf5/1.10.0     mvapich

-------------------------
   EasyBuild/3.2.1
   autotools          (L)
```

aarch64

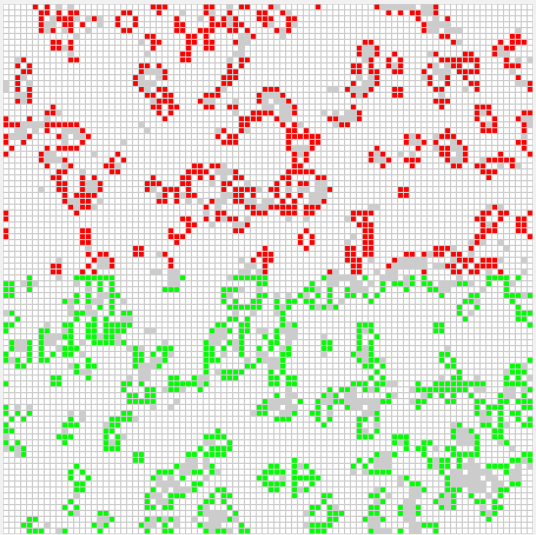
```
train01@cavium1:~> module avail

---------------------- /opt/ohpc/pub/moduledeps/gnu7-mpich ----------------------
   adios/1.11.0    mpiP/3.4.1             petsc/3.7.6        scorep/3.0
   boost/1.63.0    mumps/5.1.1            phdf5/1.10.0       sionlib/1.7.1
   fftw/3.3.6      netcdf-cxx/4.3.0       scalapack/2.0.2    superlu_dist/4.2
   hypre/2.11.1    netcdf-fortran/4.4.4   scalasca/2.3.1     tau/2.26.1
   imb/4.1         netcdf/4.4.1.1         scipy/0.19.0       trilinos/12.10.1

------------------------ /opt/ohpc/pub/moduledeps/gnu7 ------------------------
   R/3.3.3         metis/5.1.0        ocr/1.0.1          pdtoolkit/3.23
   gsl/2.3         mpich/3.2    (L)   openblas/0.2.19    superlu/5.2.1
   hdf5/1.10.0     numpy/1.12.1       openmpi/1.10.7

-------------------------- /opt/ohpc/pub/modulefiles --------------------------
   EasyBuild/3.2.1          hwloc/1.11.6       singularity/2.3
   autotools          (L)   ohpc         (L)   valgrind/3.12.0
```

OpenHPC Demo

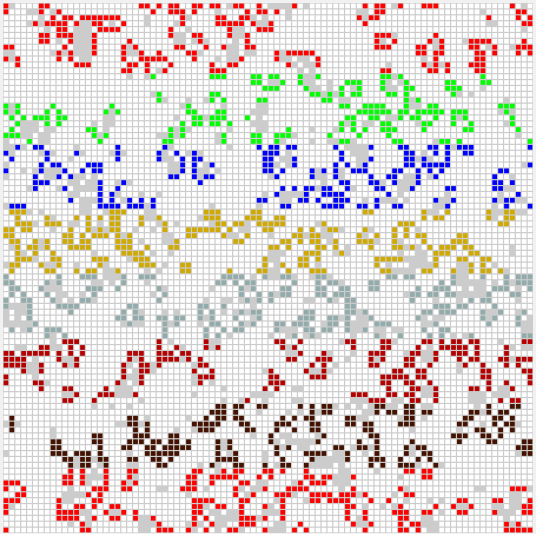
https://opensource.com/article/18/1/how-build-hpc-system-raspberry-pi-and-openhpc



OpenHPC Demo



OpenHPC Demo



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THANK YOU

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