Podman containers and HPC

CentOS HPC SIG, OpenHPC 2.0, Podman
Adrian Reber

CentOS Dojo, January 31
HPC
High Performance Computing
CentOS HPC SIG
OpenHPC: Mission and Vision

**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.

**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.
OpenHPC: Project History

**ISC’15**
BoF on the merits of interest in a community effort

**ISC’16**
v1.1.1 release, Linux Foundation announces technical leadership, founding members, and governance

**SC’15**
Initial v1.0 release, gather interested parties to work with Linux Foundation

**ISC’16**
v1.1.1, BoF

**ISC’17**
v1.3.1, BoF

**ISC’18**
v1.3.5

**ISC’19**
v1.3.8

**SC’16**
v1.2, BoF

**SC’17**
v1.3.3, BoF

**SC’18**
v1.3.6, BoF

**SC’17**
v1.3.6, BoF

**ISC’18**
v1.3.5

**ISC’19**
v1.3.8

**Oct. 2019**
OpenHPC: Current Project Members
<table>
<thead>
<tr>
<th>Functional Areas</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base OS</td>
<td>CentOS 7.6, SLES12 SP4</td>
</tr>
<tr>
<td>Architecture</td>
<td>x86_64, aarch64</td>
</tr>
<tr>
<td>Administrative Tools</td>
<td>Conman, Ganglia, Lmod, LosF, Nagios, NHC, pdsh, pdsh-mod-slurm, prun, EasyBuild, ClusterShell, mrsh, Genders, Shine, Spack, test-suite</td>
</tr>
<tr>
<td>Provisioning</td>
<td>Warewulf, xCAT</td>
</tr>
<tr>
<td>Resource Mgmt.</td>
<td>SLURM, Munge, PBS Professional, PMIx</td>
</tr>
<tr>
<td>Runtimes</td>
<td>Charliecloud, OCR, Singularity</td>
</tr>
<tr>
<td>I/O Services</td>
<td>Lustre client (community version), BeeGFS client</td>
</tr>
<tr>
<td>Numerical/Scientific</td>
<td>Boost, GSL, FFTW, Hypre, Metis, MFEM, Mumps, OpenBLAS, OpenCoarrays, PETSc, PLASMA, Scalapack, Scotch, SLEPc, SuperLU, SuperLU_Dist, Trilinos</td>
</tr>
<tr>
<td>Libraries</td>
<td>I/O Libraries</td>
</tr>
<tr>
<td></td>
<td>HDF5 (pHDF5), NetCDF/pNetCDF (including C++ and Fortran interfaces), Adios</td>
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<tr>
<td>Compiler Families</td>
<td>GNU (gcc, g++, gfortran), Clang/LLVM</td>
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<tr>
<td>MPI Families</td>
<td>MVAPICH2, OpenMPI, MPICH</td>
</tr>
<tr>
<td>Development Tools</td>
<td>Autotools, cmake, hwloc, mpi4py, R, SciPy/NumPy, Valgrind</td>
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<tr>
<td>Performance Tools</td>
<td>Dimemas, Extrae, GeoPM, IMB, Likwid, mpiP, msr-safe, OSU Micro-Benchmarks, PAPI, Paraver, pdtoolkit, Scalasca, ScoreP, SIONLib, TAU</td>
</tr>
</tbody>
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OpenHPC: A Building Block Repository

- Supports multiple operating systems
- Supports multiple architectures
- Software Repository with software packages common in HPC
- Pick relevant software packages for your site
- Detailed documentation
- Quarterly releases
OpenHPC 2.0

• Switch to newer versions of supported distributions
• Once OpenHPC 2.0 is available 1.3.x will be maintenance mode
• Switch to SLURM 19.x
• Update gcc variant - gcc9 (from gcc8)
• Update Open MPI variant - openmpi4 (from openmpi3)
• Provide ARM HPC compiler based builds
Containers and HPC
Podman
Podman
Rootless
Daemonless
mpirun podman run
podman build
Container Live Migration

FOSDEM containers devroom, Saturday
Thank you