SC19

Denver, CO | hpc is now.

openHPC

https://openhpc.community

OpenHPC Community BoF

Karl W. Schulz, Chris Simmons, David Brayford, Reese Baird, Nirmala Sundararajan, Aaron Blakeman, Adrian Reber

OpenHPC Technical Steering Committee (TSC) Members

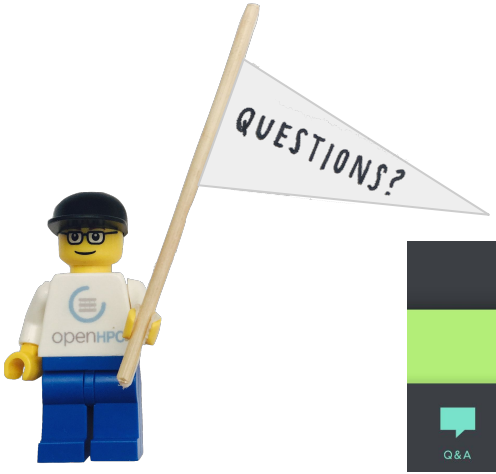
November 20, 2019 ◆ Denver, CO

URL: meet.ps/openhpc

Outline

Part I: Presentation (~30 min)

- Community members and growth snapshots
- Updates since last year
- Software in latest release
- Future work - OpenHPC 2.0



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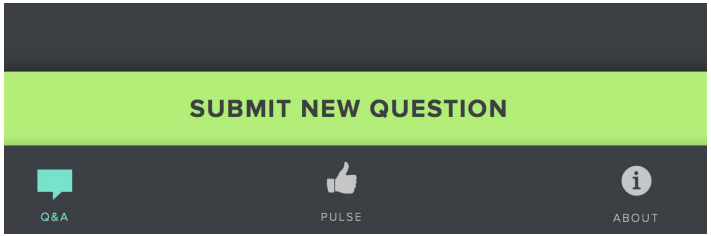


Part II: Open Forum (~30 min)

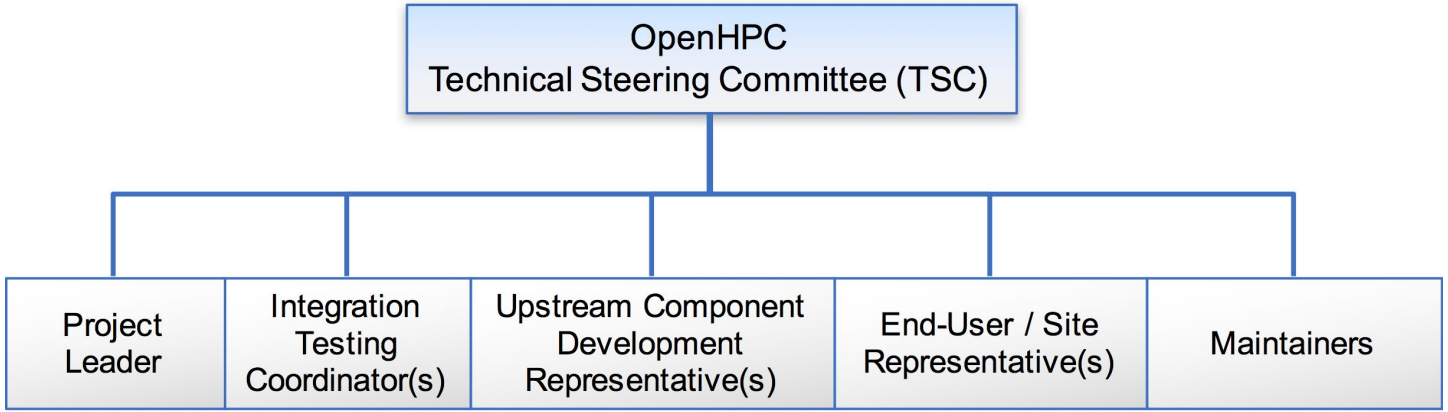
Current Project Members

THE LINUX FOUNDATION

Mixture of academics, labs, and industry

OpenHPC Technical Steering Committee (TSC)

Role Overview



Note: we completed election of TSC members for the 2019-20 term in August:

- terms are for 1 year

LINUX FOUNDATION
COLLABORATIVE PROJECTS

OpenHPC TSC – Individual Members

- Reese Baird, SpaceX (Maintainer)
- Aaron Blakeman, Intel (Maintainer)
- David Brayford, LRZ (Maintainer)
- Eric Coulter, Indiana University (End-User/Site Representative)
- Chris Downing, Amazon Web Services (Maintainer)
- Craig Gardner, SUSE (Maintainer)
- Oguzhan Herkiloglu, Comodo (Maintainer)
- Michael Karo, Altair (Component Development Representative)
- Alex Lovell-Troy, Cray (Maintainer)
- Takayuki Okamoto, Fujitsu (Maintainer)
- Kevin Pedretti, Sandia National Laboratory (Maintainer)
- Nam Pho, University of Washington (Maintainer)
- Cyrus Proctor, Speqtral Quantum Technologies (Maintainer)
- Adrian Reber, Red Hat (Maintainer)
- Karl W. Schulz, UT Austin (Project Lead, Testing Coordinator)
- Derek Simmel, Pittsburgh Supercomputing Center (End-User/Site Representative)
- Chris Simmons, UT Dallas (Maintainer)
- Ashish K Singh, Dell (Maintainer)
- Raja Subramani, Dell (Maintainer)
- Nirmala Sundararajan, Dell (Maintainer)

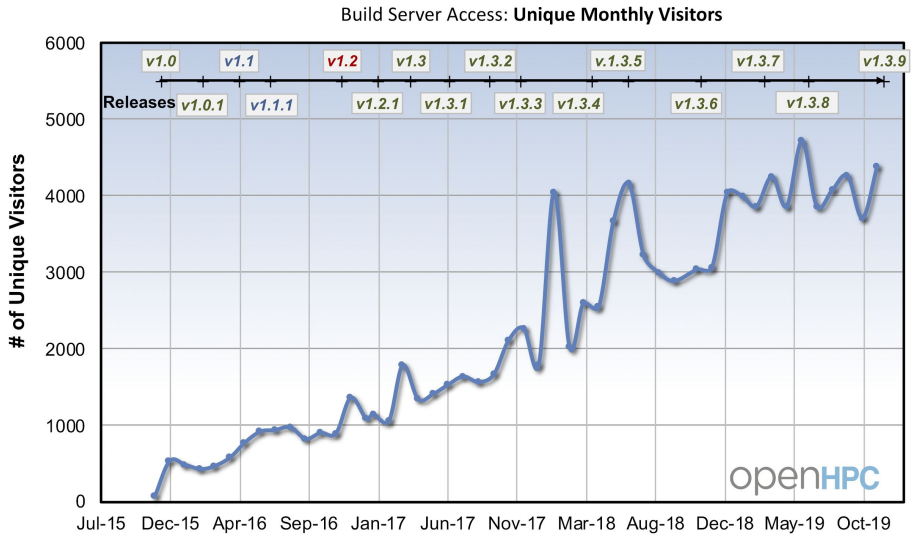
New members for 2019-2020

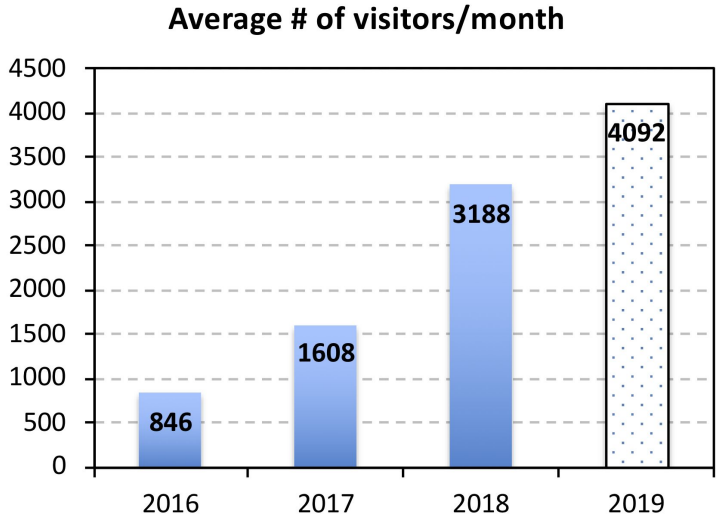
Interested in participating next year?

- *expect call for nominations next summer (June/July)*

Community Growth Snapshots

Project Adoption Growth

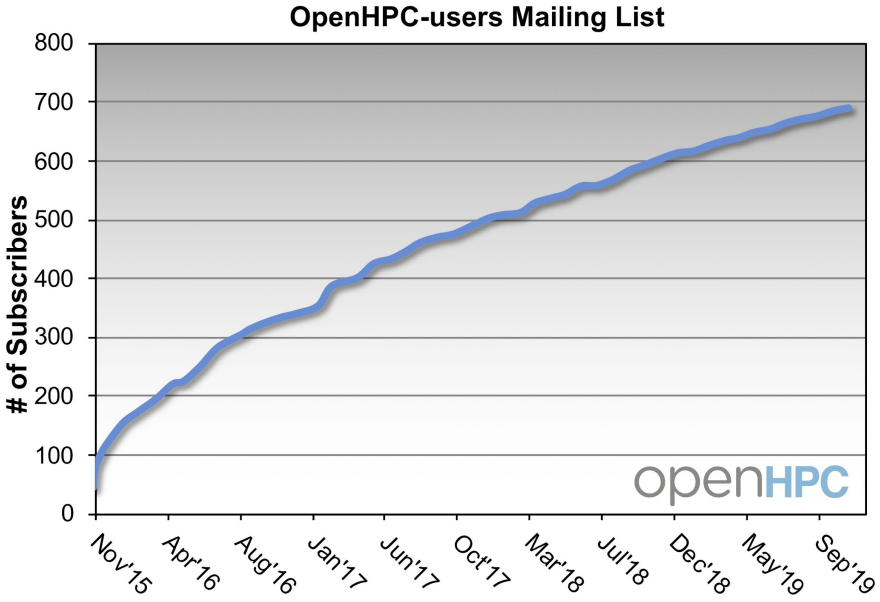




- Continued access/download growth since initial release at SC'15
- Example highlights number of unique visitors/month to the OpenHPC build server/repo(s)
- Averaging over 3.5 TB of downloads per month in 2019

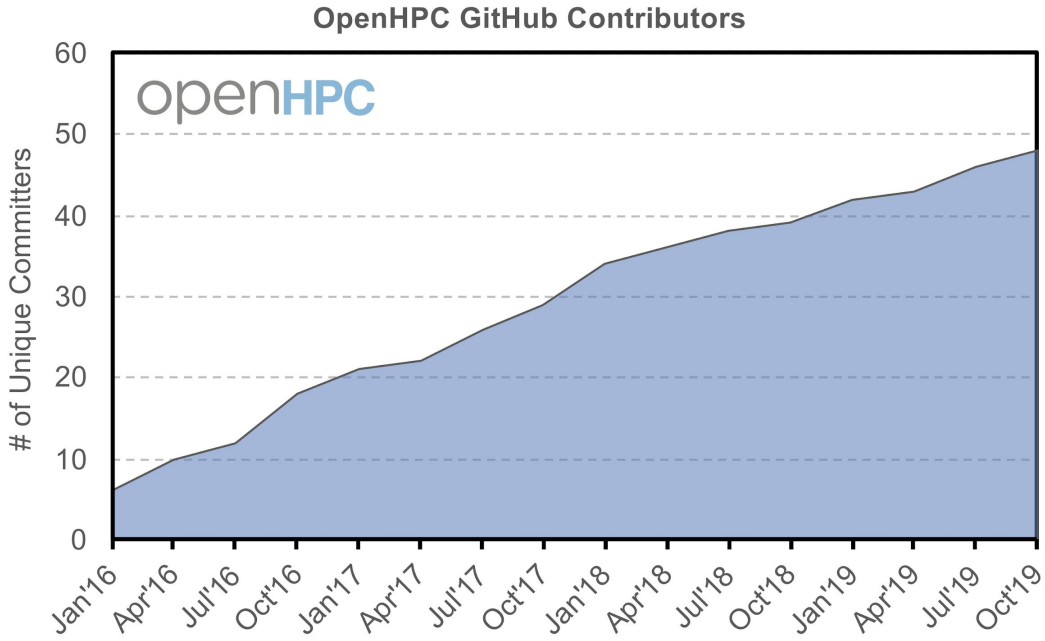
Mailing Lists - http://www.openhpc.community/support/mail-lists/

- Three lists currently:
  - openhpc-announce
  - openhpc-users
  - openhpc-devel
- Great place to interact with developers and others using elements from the project
- *Really appreciate the great interaction we've seen on the list*



~70 posts/month in 2019

GitHub Contributors



- Continued growth in # of contributors

Reminder that a wide variety of recipes now available

[Nov. 2015]

OpenHPC (v1.0)
Cluster Building Recipes

CentOS7.1 Base OS
Base Linux Edition*

Initially, we started off with
only a single recipe with intent to expand

10 recipes available in v1.3.9 release

excellent place to start if you are new to the project or want to kick the tires

We continue to expand recipe option(s) with multiple resource managers, OSes, provisioners, and architectures:

x86_64:

- Install_guide-CentOS7-Warewulf-PBSPro-1.3.9-x86_64.pdf
- Install_guide-CentOS7-Warewulf-SLURM-1.3.9-x86_64.pdf
- Install_guide-CentOS7-xCAT-Stateful-SLURM-1.3.9-x86_64.pdf
- Install_guide-CentOS7-xCAT-Stateless-SLURM-1.3.9-x86_64.pdf
- Install_guide-SLE_12-Warewulf-PBSPro-1.3.9-x86_64.pdf
- Install_guide-SLE_12-Warewulf-SLURM-1.3.9-x86_64.pdf

aarch64:

- Install_guide-CentOS7-Warewulf-PBSPro-1.3.9-aarch64.pdf
- Install_guide-CentOS7-Warewulf-SLURM-1.3.9-aarch64.pdf
- Install_guide-SLE_12-Warewulf-PBSPro-1.3.9-aarch64.pdf
- Install_guide-SLE_12-Warewulf-SLURM-1.3.9-aarch64.pdf

Updates

will next highlight some new items/changes since last year's BoF

Updates

- No major packaging convention changes since last year's BoF
- We have had 5 releases since SC'18 (2 were small bug fix updates)
- OS updates:
  - CentOS7.6 and SLES12 SP4 support introduced in v1.3.7 release
  - CentOS7.7 introduced in v1.3.9 release
- Package build updates:
  - Now packaging Singularity 3.x version (go-based) - starting with v1.3.7 release
  - SLURM build updates:
    - *enable X11 support*
    - *enable jobcomp_elasticsearch plugin*
    - *enabled Lua job submit plugin*

Updates (cont.)

- Updated recipes and test environment to use BeeGFS 7.x client (v1.3.8)

- Warewulf updates:
  - enable support for NVMe devices in Warewulf provisioning (v1.3.7)
  - fix for Warewulf stateful UEFI on aarch64 (v1.3.9)

- Other installation recipes leveraging OpenHPC available on GitHub wiki under User Resources
  - XSEDE Compatible Basic Cluster
  - Vanilla recipe using Ansible (LANL)
  - Ansible playbook for OpenHPC (Linaro)

Updates (cont.)

- Miscellaneous:
  - patch applied to MPICH builds to support job launch with hostnames that do not end in a number (v1.3.8.1)
  - re-enabled genders support for pdsh (v1.3.7)

- New CI hardware additions:
  - Thanks to Marvell and Linaro, we now have some dedicated ThunderX2 servers housed at Linaro's UK facility
  - will be used to support CI efforts with v2.0 and future releases

- PEARC'19 tutorial: "Practical OpenHPC: Cluster Management, HPC Applications, Containers and Cloud"
  - large slide deck (~140 slides) with overview and hands-on examples
  - containerization, performance tools, depoying in the cloud, etc

OpenHPC v1.3.9 Release

November 2019

OpenHPC v1.3.9 - Current S/W components

Functional Areas	Components (new since v1.3.7)
Base OS	CentOS 7.7, SLES12 SP4
Architecture	aarch64, x86_64
Administrative Tools	Conman, Ganglia, Lmod, LosF, Nagios, NHC, pdsh, pdsh-mod-slurm, prun, EasyBuild, ClusterShell, mrsh, Genders, Shine, Spack, test-suite
Provisioning	Warewulf, xCAT
Resource Mgmt.	SLURM, Munge, PBS Professional, PMIx
Runtimes	Charliecloud, OpenMP, OCR, Singularity
I/O Services	Lustre client, BeeGFS client*
Numerical/Scientific Libraries	Boost, GSL, FFTW, Hypre, Metis, MFEM, Mumps, OpenBLAS, OpenCoarrays, PETSc, PLASMA, Scalapack, Scotch, SLEPc, SuperLU, SuperLU_Dist, Trilinos
I/O Libraries	HDF5 (pHDF5), NetCDF/pNetCDF (including C++ and Fortran interfaces), Adios
Compiler Families	GNU (gcc, g++, gfortran), Clang/LLVM, Intel Parallel Studio*
MPI Families	MVAPICH2, OpenMPI, MPICH, Intel MPI*
Development Tools	Autotools, cmake, hwloc, mpi4py, R, SciPy/NumPy, Valgrind
Performance Tools	PAPI, IMB, Likwid, mpiP, pdtoolkit TAU, Scalasca, ScoreP, SIONLib, GeoPM, msr-safe, Dimemas, Extrae, Paraver, OSU Microbenchmarks

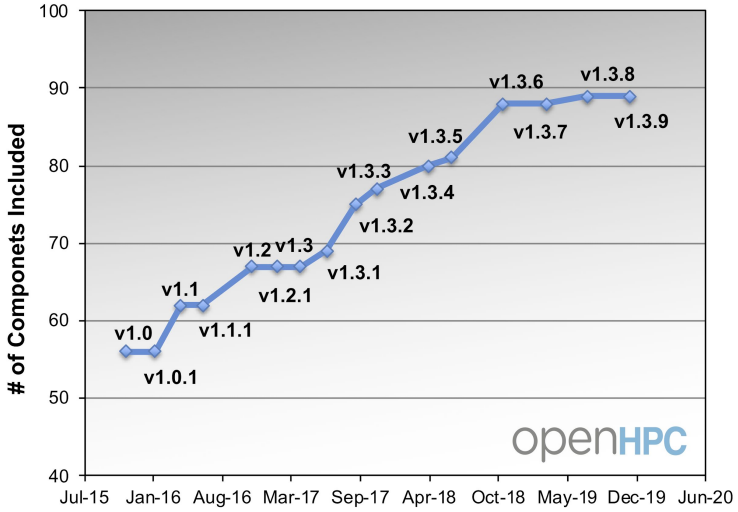
- Additional dependencies not provided by BaseOS or community repos are also included
- builds against Intel Parallel Studio toolchain also provided for many development packages

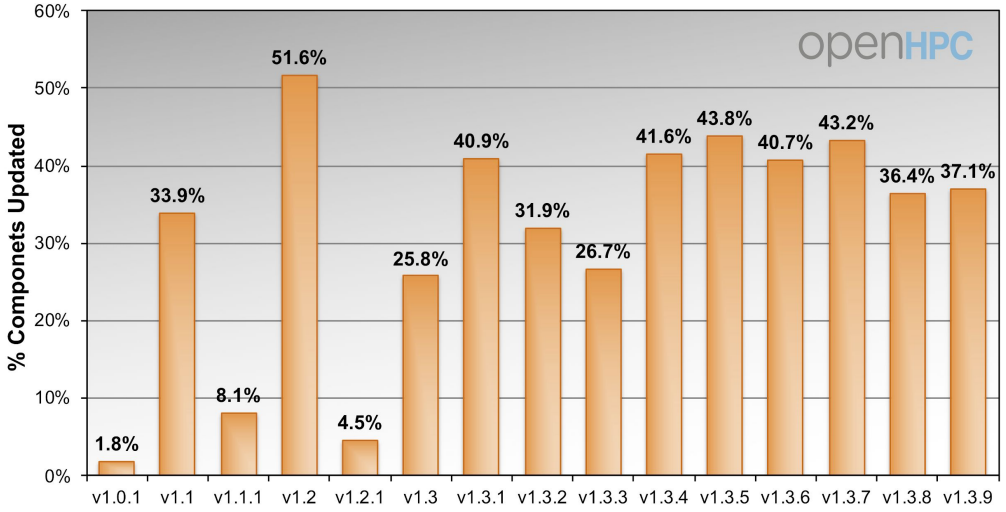
OpenHPC v1.3.9 - RPM counts

of pre-packaged RPMs available

Base OS	aarch64	x86_64	noarch
CentOS 7	413	743	45
SLES 12	417	736	45

Component growth/update history



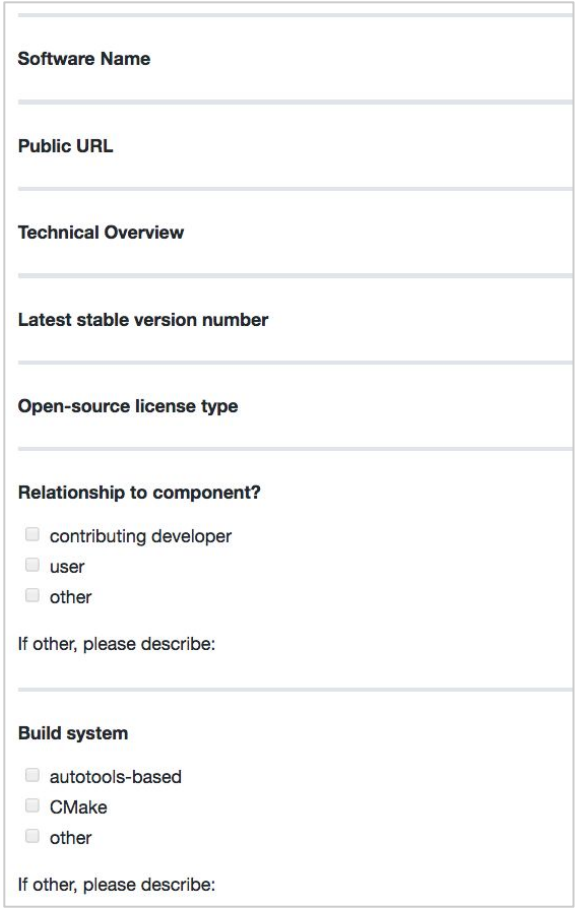


- Additional components accepted for inclusion in future release:
  - buildtest
  - OpenUCX

Requesting Additional Software

- Recall that we have a simple submission site for new requests:
  - https://github.com/openhpc/submissions
- Items added via this mechanism since v1.2 release (Nov' 16)
  - BeeGFS client
  - xCAT recipe
  - hwloc
  - Singularity
  - LLVM/clang
  - PLASMA
  - pNetCDF
  - SCOTCH
  - SLEPc
  - PMIx
  - MPI4py
  - Likwid
  - MFEM
  - NHC
  - Charliecloud
  - GeoPM
  - Dimemas/Extrae, Paraver
  - OpenCoarrays

Next Submission Deadline: December 2nd, 2019
(continue thereafter on a rolling quarterly basis)

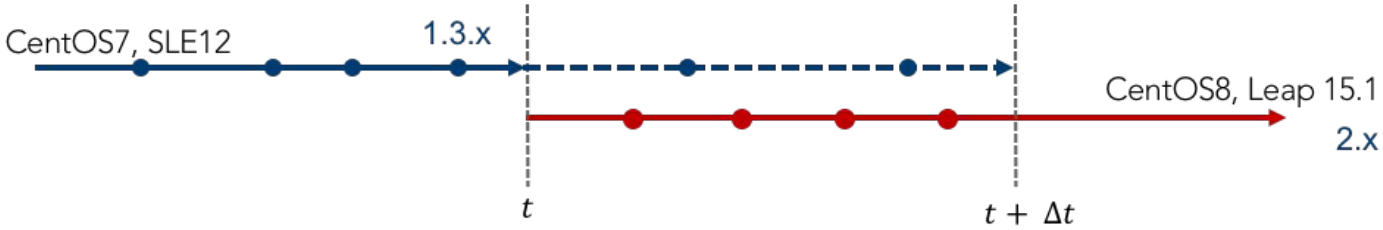


Future Work - OpenHPC 2.0

November 2019

OpenHPC 2.0

- Targeting major distro updates for 2.0:
  - CentOS 8
  - SUSE Leap 15.1 (switching to Leap from SLES)



- Once we release a new major branch (e.g. v2.x) which supports a newer major distro version at time t, we will restrict updates to previous branch (e.g. v1.3.x) to include:
  - security patches (e.g. address known CVEs)
  - significant bugs affecting functionality
  - older branch stays in maintenance mode for Δt = 1 year

Questions: https://meet.ps/openhpc

OpenHPC 2.0 - additional planned items

- switch to SLURM 19.x (from 18.x)
- updated base gcc variant -> gcc9 (from gcc8)
- updated OpenMPI variant -> openmpi4 (from openmpi3)
- updated MPICH configuration -> use CH4 device layer
    - will allow inclusion of OpenUCX

Questions: https://meet.ps/openhpc

OpenHPC 2.0 - additional planned items

- ARM HPC package builds:
  - expect to roll out compatibility builds with a forthcoming ARM HPC compiler release
  - will provide compatibility package to support modules *after* ARM HPC compiler is installed locally; similar to approach with Intel toolchain
- Updated llvm toolsuite (clang/clang++, flang replacement)
- Package repository location changing:
  - we will be separating the repo location from the underlying build system
  - expect to pull from http://repos.openhpc.community

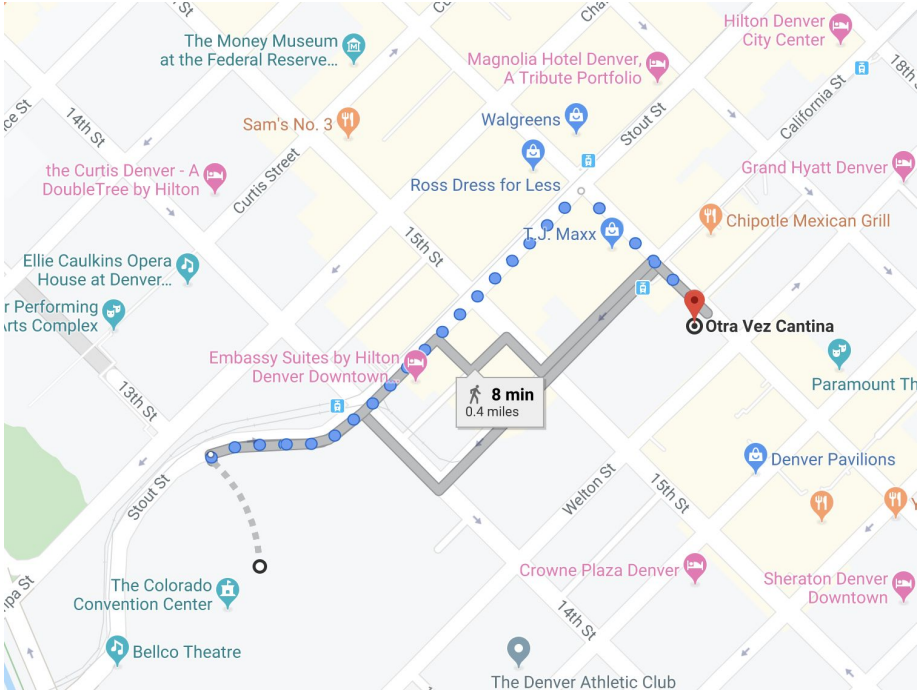
OpenHPC 2.0 - additional planned items

- RPM macro updates to better support localized package rebuild customization
  - for example, if you want to build with more optimized flags for a local architecture
  - will allow for co-installation of local customized build and default ohpc variant
- Mechanism to pre-register installed OpenHPC toolchain(s) for use with EasyBuild
- Release Timing? -> targeting Q1 2020
- *Other items based on your feedback…*
  - Considering maintaining cloud images for quick cluster deployment:
    - would focus on development environment + resource manager
    - start with EC2

Questions: https://meet.ps/openhpc

Open Discussion

- Before opening it up for discussion, one last item to mention...
- OpenHPC is hosting a Community Happy Hour this evening
  - 5-7pm at Otra Vez Cantina, 610 16st St Mall, Denver, CO
  - within walking distance from convention center
  - opportunity to mingle with others from the community



Open Discussion

https://meet.ps/openhpc

Pointers to Online Resources

- OpenHPC Home: http://www.openhpc.community/
- Primary GitHub Site: https://github.com/openhpc/ohpc
- Package Repositories: http://build.openhpc.community/OpenHPC:/
- OBS Frontend: https://build.openhpc.community
- Component Submission: https://github.com/openhpc/submissions
- System Registry: System Registration Form
- CI Infrastructure: http://test.openhpc.community:8080
- OpenHPC Wiki: https://github.com/openhpc/ohpc/wiki
  - includes links to overview paper and past presentations

- Mailing Lists: http://www.openhpc.community/support/mail-lists/
  - openhpc-announce
  - openhpc-users
  - openhpc-devel