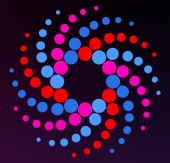


OpenHPC Community BoF

Christopher Simmons, Derek Simmel, Jeremy Siadal, Adrian Reber

OpenHPC Technical Steering Committee (TSC) Members

November 17, 2022

Outline

- Part I: Presentation (~30 min)
  - Community members and growth snapshots
  - CentOS8 EOL announcement and resulting activities
  - Latest and upcoming releases
- Part II: Open Forum (~30 min)

Current Project Members

THE LINUX FOUNDATION

OpenHPC TSC – Individual Members

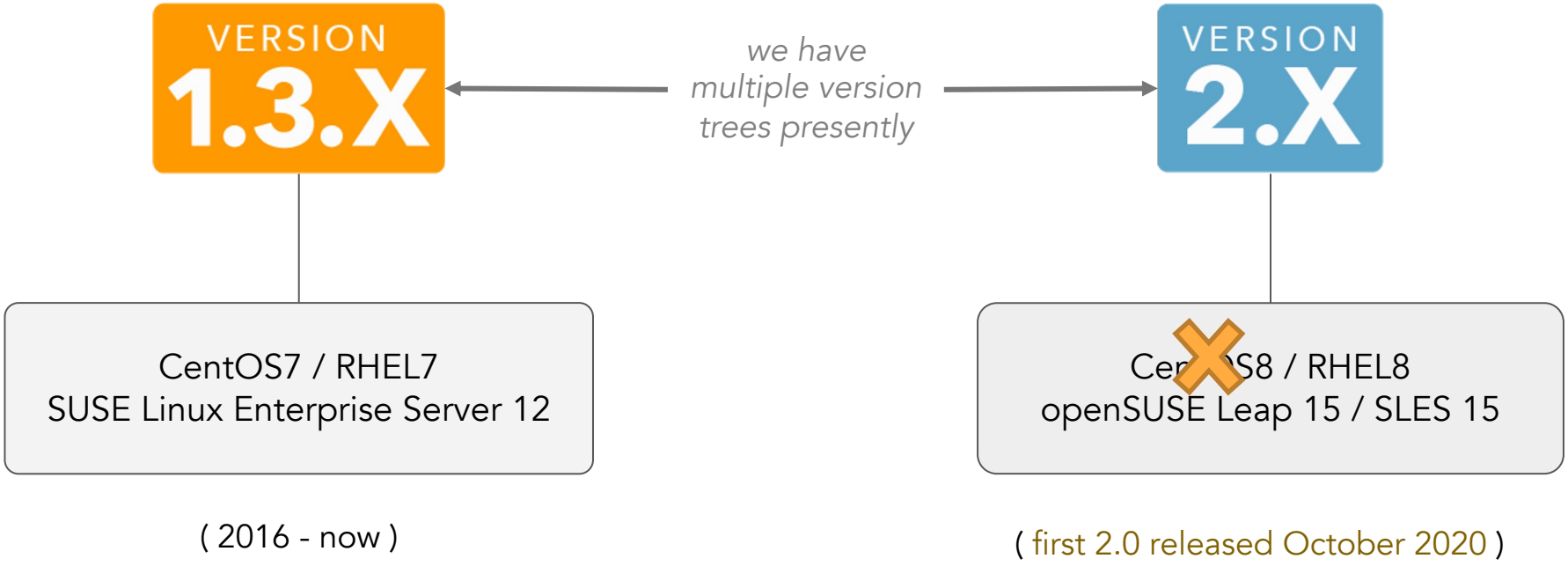
New members for 2022-2023

- Reese Baird, SpaceX (Maintainer)
- David Brayford, Intel (Maintainer)
- Eric Coulter, Georgia Institute of Technology (End-User/Site Representative)
- Chris Downing, Amazon Web Services (Maintainer)
- Alfred Egger (University of Salzburg) End-User/Site Representative)
- Brent Gordo, Arm (Maintainer)
- Michael Karo (Altair)
- Adrian Reber, Red Hat (Maintainer)
- Karl W. Schulz, AMD Research (Testing Coordinator)
- Jeremey Siadal, Intel (Maintainer)
- Derek Simmel, Pittsburgh Supercomputing Center (End-User/Site Representative)
- Christopher Simmons, UT Dallas (Maintainer, Project Lead)
- Caeser Stoica, Lenovo (Maintainer)
- Jason Wells, Harvard (End-User/Site Representative)

https://github.com/openhpc/ohpc/wiki/Governance-Overview

Interested in participating?
TSC nominations done in June yearly

OpenHPC: multi distro support

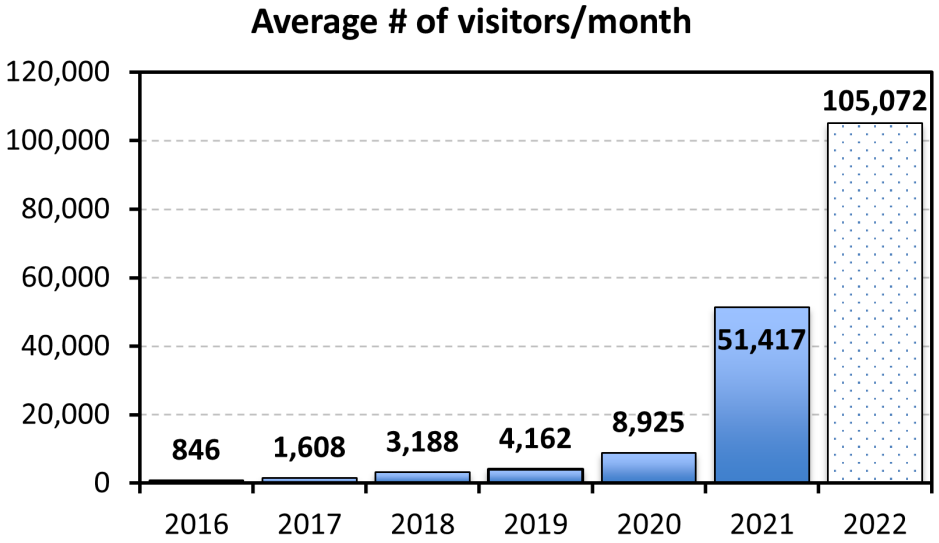


(2016 - now)

(first 2.0 released October 2020)

Community Growth Snapshots

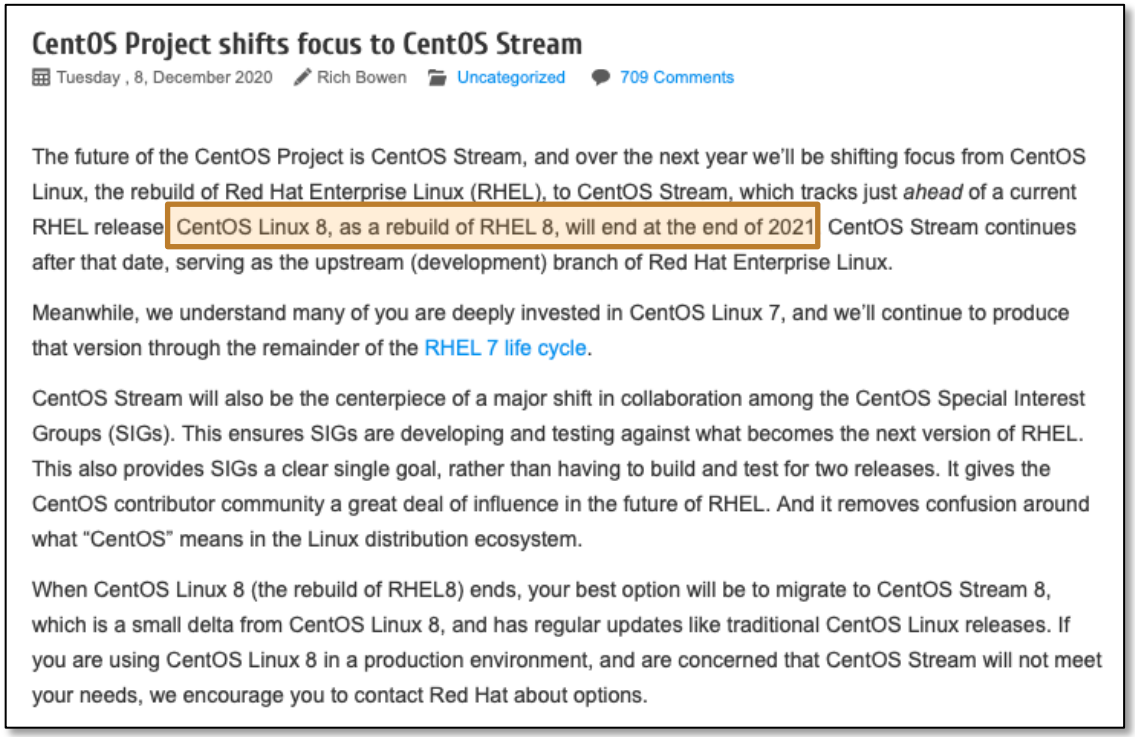
Project Adoption Growth



- Summary of access/download growth since initial release at SC'15
- Plot highlights number of unique visitors/month to the OpenHPC build server/repo(s)
- Significant uptake with 2.x releases and over 120K in October '22!
- 75 TB per month and growing in 2022; Up from 26 TB per month in 2021

CentOS 8 Business

CentOS8 Announcement - Dec 2020



CentOS Project shifts focus to CentOS Stream

Tuesday , 8, December 2020 Rich Bowen Uncategorized 709 Comments

The future of the CentOS Project is CentOS Stream, and over the next year we'll be shifting focus from CentOS Linux, the rebuild of Red Hat Enterprise Linux (RHEL), to CentOS Stream, which tracks just *ahead* of a current RHEL release CentOS Linux 8, as a rebuild of RHEL 8, will end at the end of 2021 CentOS Stream continues after that date, serving as the upstream (development) branch of Red Hat Enterprise Linux.

Meanwhile, we understand many of you are deeply invested in CentOS Linux 7, and we'll continue to produce that version through the remainder of the RHEL 7 life cycle.

CentOS Stream will also be the centerpiece of a major shift in collaboration among the CentOS Special Interest Groups (SIGs). This ensures SIGs are developing and testing against what becomes the next version of RHEL. This also provides SIGs a clear single goal, rather than having to build and test for two releases. It gives the CentOS contributor community a great deal of influence in the future of RHEL. And it removes confusion around what "CentOS" means in the Linux distribution ecosystem.

When CentOS Linux 8 (the rebuild of RHEL8) ends, your best option will be to migrate to CentOS Stream 8, which is a small delta from CentOS Linux 8, and has regular updates like traditional CentOS Linux releases. If you are using CentOS Linux 8 in a production environment, and are concerned that CentOS Stream will not meet your needs, we encourage you to contact Red Hat about options.

- Like most folks, we were caught off guard by this announcement to discontinue CentOS8 on Dec. 31, 2021
- Through 2021, CentOS has been the preferred distro in use by OpenHPC users
- Initially considered multiple alternative options:
  - CentOS8 Stream
  - RHEL8 proper
  - binary-compatible RHEL8 clones
  - solicited community feedback to help guide our path…

Some Community Polling Results Regarding CentOS8

ISC High Performance
The HPC Event.

OpenHPC Community BoF

Chat | Questions | Polls

If you are currently using CentOS 8, what do you plan to use as a replacement going forward?

2 days ago

9%	CentOS 8 Stream
11%	RHEL 8
13%	AlmaLinux
7%	openSUSE Leap
4%	Oracle Linux
50%	Rocky Linux
7%	Other

If you are currently using CentOS 8, what do you plan to use as a replacement going forward?

Vote submitted. Change poll answer

Poll Results:

14%	CentOS 8 Stream
10%	RHEL 8
0%	AlmaLinux
7%	OpenSUSE Leap
3%	Oracle Linux
55%	Rocky Linux
10%	Other

PEARC21

If using a RHEL variant, which one(s): Type: Multiple Answer 9

SC21 St. Louis, MO | science & beyond.

Community Plans for supporting RHEL8 Variants

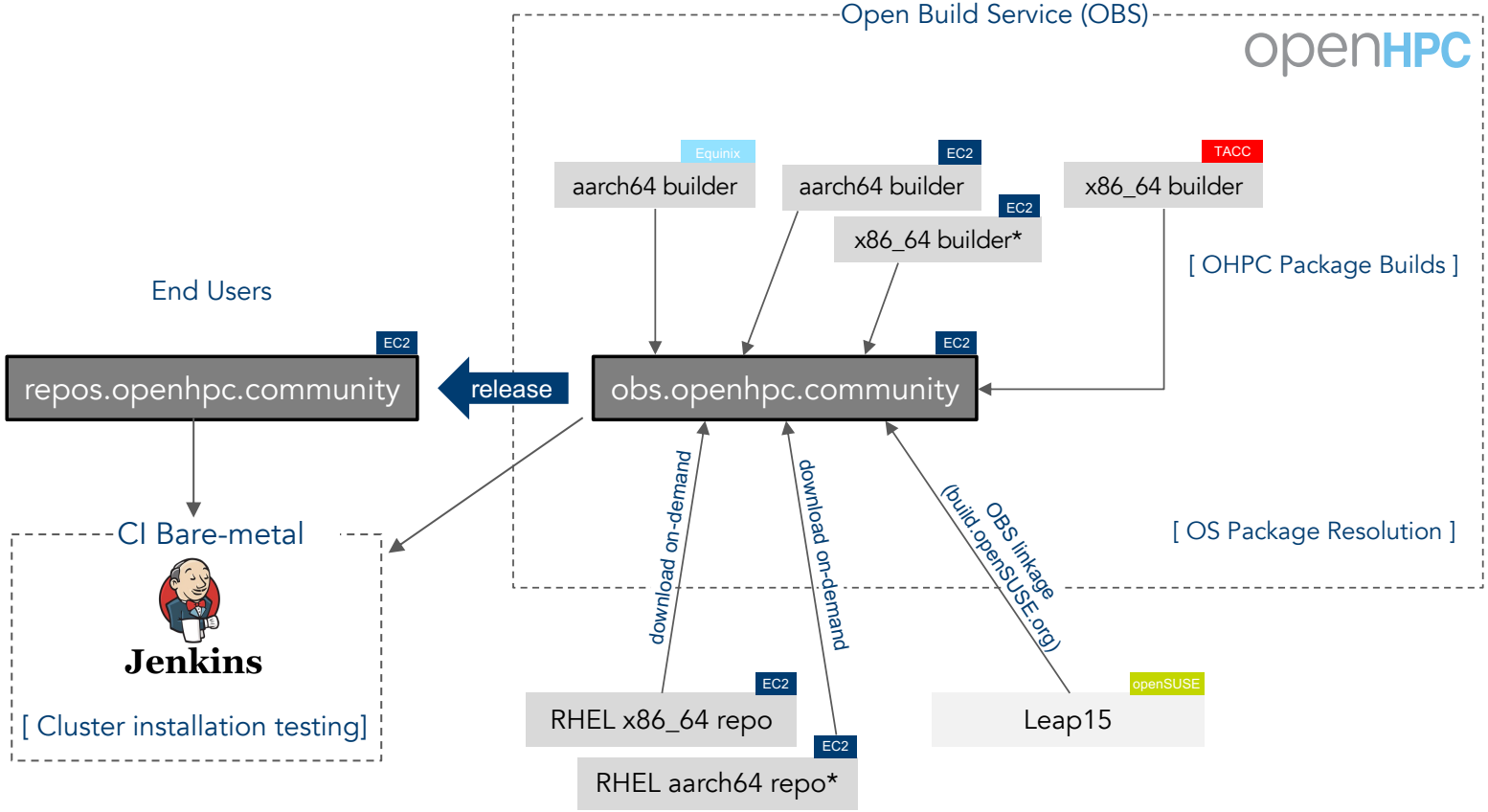
- Based on community feedback and additional infrastructure testing, we have pivoted as follows for RHEL-based usage (starting with the v2.4 release):
  - Build:
    - ohpc packages are built directly against RHEL proper (using community entitlements)
    - OBS-based build system infrastructure updated to support this change
  - Test:
    - example installation recipes for RHEL updated to use a binary compatible clone
    - continuous integration (CI) infrastructure also updated to leverage alternative RHEL clone
    - based on initial community feedback, we chose Rocky8 as the basis for example recipes
      - *Other RHEL8 binary clones should also be compatible*

Rocky Linux™

- Note: we continue to support OpenSUSE Leap 15.x as well

openSUSE

Updated OpenHPC Build/Delivery Architecture (2.4+)



Release Updates

VERSION 2.X

OpenHPC v2.6 - S/W components

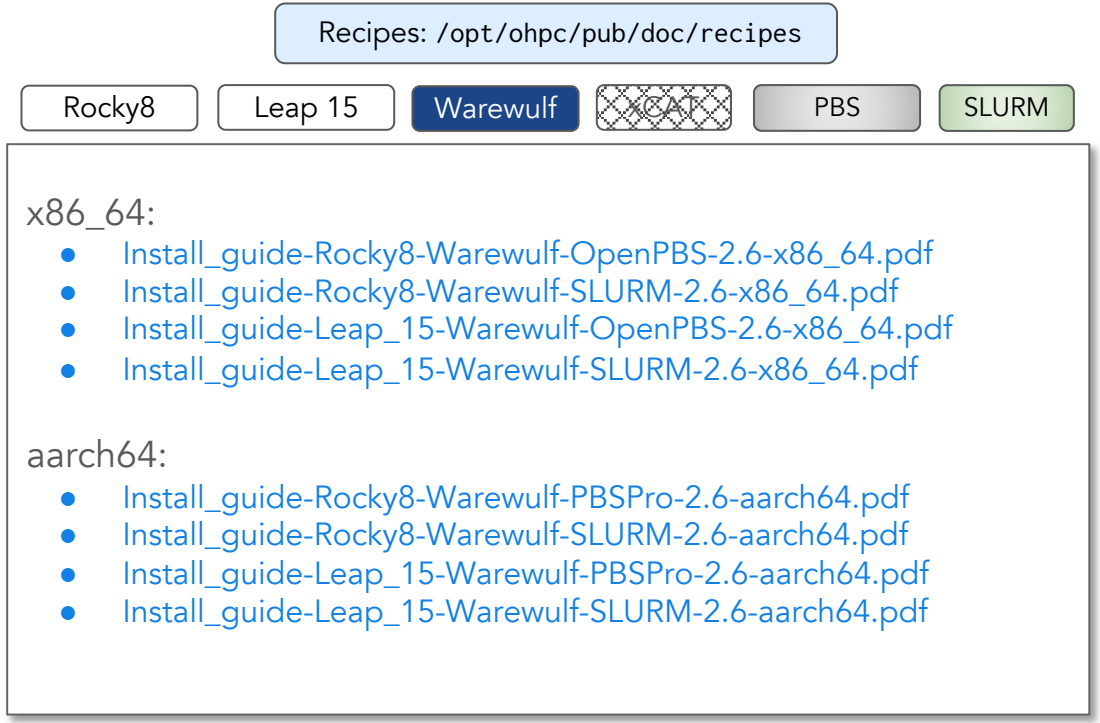
Functional Areas	Components (components available 79)
Base OS	RHEL 8.6, OpenSUSE Leap 15.3
Architecture	x86_64, aarch64
Administrative Tools	Conman, Lmod, LosF, Nagios, NHC, pdsh, pdsh-mod-slurm, prun, EasyBuild, ClusterShell, Genders, Shine, Spack, test-suite
Provisioning	Warewulf3, Warewulf4
Resource Mgmt.	SLURM, Munge, OpenPBS, Magpie
Runtimes	Charliecloud, ~~Singularity~~
I/O Services	Lustre client (community version), 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), Intel oneAPI Toolkit, ARM Allinea Studio*
Transport Layers	Libfabric, UCX
MPI Families	MVAPICH2, OpenMPI, MPICH, Intel oneAPI HPC Toolkit
Development Tools	Autotools, cmake, hwloc, mpi4py, R, SciPy/NumPy, Valgrind
Performance Tools	Dimemas, Extrae, GeoPM, IMB, Likwid, msr-safe, OSU Micro-Benchmarks, PAPI, Paraver, pdtoolkit, Scalasca, ScoreP, SIONLib, TAU

Additional dependencies not provided by BaseOS or community repos are also included

v2.6: Installation recipes available

[Key takeaway]

- In addition to being a package repository, OpenHPC provides validated recipes for bare-metal system installs
- Recipes organized by OS, architecture, and key administrative components
- **2.6** release includes **8** different recipes:
  - CentOS8 -> Rocky8
- the **docs-ohpc** RPM installs these recipes (along with shell scripts encapsulating all commands)



can use these guides as starting point for bare-metal installs

v2.6: Update Highlights

- Updated target distro support to EL 8.6 and Leap 15.3
- New compiler variant (gnu12) introduced with this release
- SLURM build updated to include optional REST API interface package
- Updated SLURM recipes to include cgroups.conf
- Fix for Leap 15.3 provisioning with Warewulf (https://github.com/openhpc/ohpc/issues/1602)
- Updated Rocky container images for OHPC 2.6 for x86_64 and aarch64
  - `quay.io/ohpc/ohpc-gnu12:latest`
  - `quay.io/ohpc/ohpc-gnu12-openmpi4:latest`
  - `quay.io/ohpc/ohpc-gnu12-mpich:latest`
  - `quay.io/ohpc/ohpc-gnu12-mvapich2:latest`
- Tech preview build of Warewulf 4.x

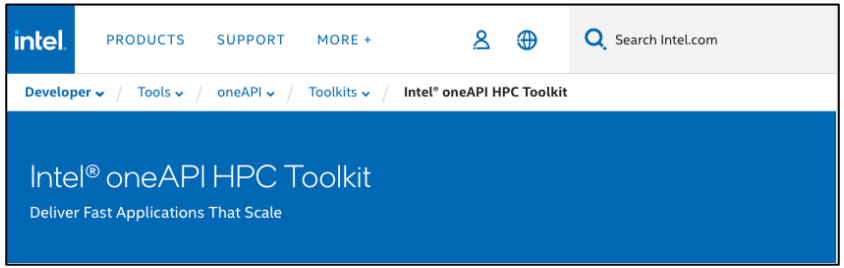
v2.6: Known Issues

- Several package builds with the latest Intel classic compiler exhibited problems with the OpenHPC test suite.
  - Affected packages are plasma, TAU, and superlu_dist
  - Users are advised to stick with the gcc (gnu12) compiler variant if using these packages
- We have encountered package checksum issues from upstream Rocky Linux when creating Warewulf VNFS images
  - If you encounter issues installing the tzdata package for a Rocky8 VNFS image (similar to https://bugs.rockylinux.org/view.php?id=694) consider specifying a preferred mirror URL
  - Set $YUM_MIRROR_BASE variable and retry the `mkchroot` command
  - Available mirrors are listed at https://mirrors.rockylinux.org/mirrormanager/mirrors
  - In the US, we have consistent success using the following:

    export YUM_MIRROR_BASE=https://dfw.mirror.rackspace.com/rocky

2.6 updates (cont.)

- Intel repackaged the previous PSXE compiler variants within the oneAPI Toolkit (also introduced new clang-based variants)
- Have introduced updated compatibility packages that enables usage with oneAPI classic compiler variants: icc, icpc, ifort
- Usage is similar to previous releases, but made easier now by the fact that the compiler can be installed directly from an online repository
  - convenience package will setup the oneAPI repository locally: intel-oneapi-toolkit-release-ohpc




```
# Enable Intel oneAPI and install OpenHPC compatibility packages
[sms]# yum -y install intel-oneapi-toolkit-release-ohpc
[sms]# yum -y install intel-compilers-devel-ohpc
[sms]# yum -y install intel-mpi-devel-ohpc
```

```
[sms]# rpm -ql intel-oneapi-toolkit-release-ohpc
/etc/yum.repos.d/oneAPI.repo
```

2.6 updates (cont.)

- Note: the newer compatibility package relies on a utility shipped with oneAPI packages to generate modulefiles for locally installed versions
  - e.g. /opt/intel/oneapi/modulefiles-setup.sh

```
$ module swap gnu9 intel
Loading compiler version 2021.4.0
Loading tbb version 2021.4.0
Loading compiler-rt version 2021.4.0
Loading debugger version 10.2.4
Loading mkl version 2021.4.0
```

- You will thus see more module dependencies that get loaded
- Additional note: if installing oneAPI compilers via package managers, these will land in /opt/intel
  - need to make this path available on computes in example installation recipes
  - 2.6 variants call out sharing over NFS directly

2.6 updates (cont.)

https://developer.arm.com/downloads/-/arm-compiler-for-linux

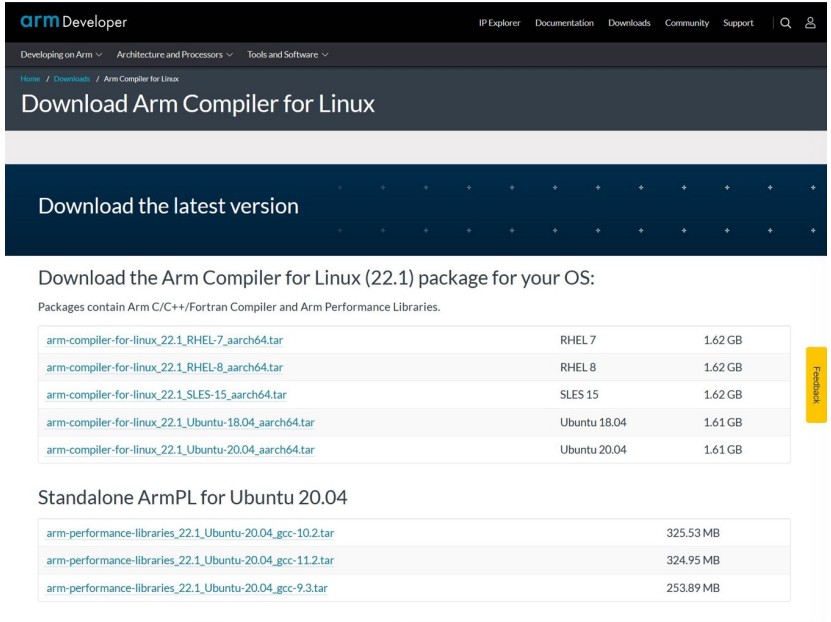
- Compatibility package for Arm compiler has also been updated to work with newer release
- In this case, need to download install package separately and install the compilers first locally

```
# Install OpenHPC compatibility packages
[sms]# zypper install arm1-compilers-devel-ohpc
```

```
$ module swap gnu9 arm1
$ which armclang
/opt/ohpc/pub/arm/arm-linux-compiler/bin/armclang
```

```
$ module list

Currently Loaded Modules:
  1) autotools         5) clang-autocomplete/21.1   9) ucx/1.11.2
  2) prun/2.2          6) arm22/22.1               10) libfabric/1.13.0
  3) ohpc              7) arm1/compat
  4) binutils/10.2.0   8) hwloc/2.5.0
```



Mentorship Program

- Mentorship program for 2022
  - 4 students selected out of ~25 applicants
  - Project 1: Replacement for Ganglia / new monitoring stack based on Grafana
  - Project 2: Better integration of OHPC software with EasyBuild
  - Project 3: Adding Elastic Fabric Adaptor support to OHPC
  - Project 4: Nvidia Container Toolkit with OpenHPC
- Mentorships for 2023 will open in May 2023
  - Apply via the LFX Mentorship portal
  - Join the OHPC Users email list to be notified when open

Additional Future Items

- one final 1.3.x release as 1.3.10 in Q1 2023 with support for RHEL/CentOS 7.9
- 2.7 items:
  - Support for OpenEuler and tested against Kupeng (Huawei's ARM architecture)
  - Warewulf4
  - job launch support with PMIx reintroduced for OpenMPI
  - component packaging for use with Arm Compiler
  - ???? <your input here>
- RHEL9 tech preview builds; soon to be published
- Future work will focus heavily on DevOps and Cloud recipes

Open Discussion