



# EESSI meeting

June 3rd 2021

<https://github.com/EESSI/meetings/wiki>

# Agenda



1. Quick introduction by new people
2. EESSI-related meetings in last month [Bob, Kenneth]
3. Progress update per EESSI layer [Bob, Peter, Kenneth]
4. 2021.03 version of pilot repository: status [Kenneth]
5. Outlook to next pilot version [Kenneth]
6. Testing with ReFrame [Caspar]
7. AWS/Azure update + infrastructure in AWS [Kenneth, Terje]
8. EESSI paper [Thomas, Kenneth]
9. NESSI update [Thomas]
10. Upcoming events [Kenneth]
11. Q&A

# Quick introduction by new people



**New people on the call: feel free to introduce yourself!**

- Who are you, where do you work, on what?
- Why are you interested in the EESSI project?
- Are you planning to actively contribute,  
and if so, to which aspect(s) of the project?

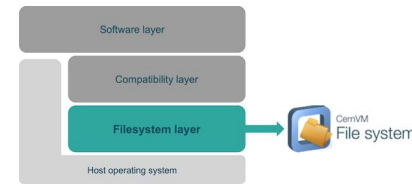
# EESSI-related meetings



- May 11th: Monthly CernVM-FS coordination meeting (Bob, Kenneth)
  - Mostly about adding user code to repositories (using containers)
  - Discussion about the in-place updates corruption issue
    - Tricky to change this part of the code, will not be fixed anytime soon...
    - In-place updates are discouraged: will also be highlighted in the docs
    - Workaround: use symlinks to avoid in-place updates of files...
- May 19th: Chat with Stefano Angioni - Univ. of Bath, UK (Kenneth, via MS Azure)
- May 19th, May 26th, May 28th: EESSI paper meetings (Alan & co)
- June 1st: Chat with Wageningen University & Research (Jaco, Bob, Kenneth)
- June 2nd: Discuss application of ReFrame library tests (Caspar)
  - See “Testing with ReFrame” slide

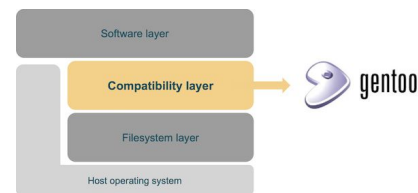
[Bob, Kenneth]

# Progress update: filesystem layer

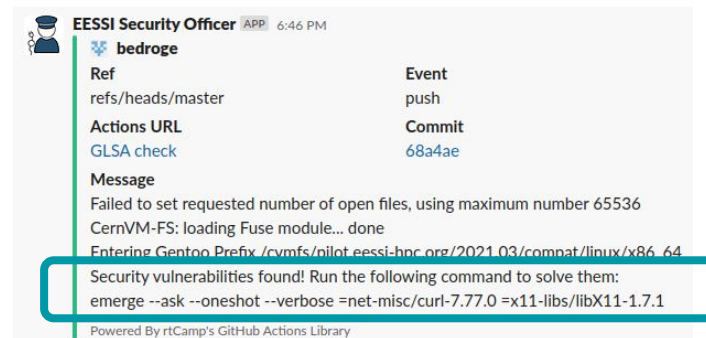


- Stratum 1 @ RUG is currently down due to maintenance in OpenStack platform
  - But doesn't affect availability of EESSI pilot repository thanks to Stratum 1 at UiO
  - Highlights the need for monitoring of our CernVM-FS network...
- Small updates to the PR for automatically building the client container images
  - See <https://github.com/EESSI/filesystem-layer/pull/83>
  - Also includes fuse-overlayfs
- 2020.12 pilot version was removed from the repository

# Progress update: compatibility layer

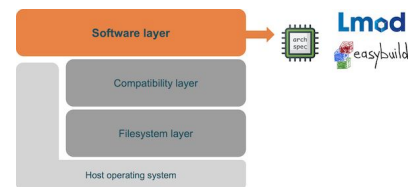


- Various security updates were installed for EESSI pilot 2021.03
  - Only relevant ones were for `misc/curl` and `x11-libs/libX11`
  - Updates are currently applied best effort by Bob
  - Process is currently very slow (`emerge --sync` takes hours)
- Initial version of a GitHub Action that automatically reports about Gentoo security vulnerabilities (by using Gentoo's `glsa-check` tool)
  - Reports to private subchannel in EESSI Slack
  - Can be run as a daily cron job
  - Also reports how to fix the issue
  - Issues in the screenshot still need to be fixed :-)



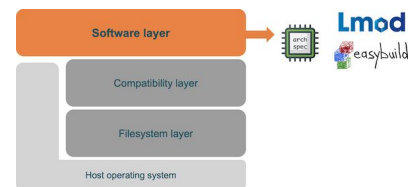
[Bob]

# Progress update: software layer



- New software added to EESSI pilot 2021.03:
  - Horovod 0.21.3
  - GROMACS 2020.4
  - QuantumESPRESSO 6.6
- PR for a script that facilitates creating the tarball containing software to be ingested
  - See <https://github.com/EESSI/software-layer/pull/111>
  - First step in automating process of getting software installs from build node to Stratum 0
- Meeting with NVIDIA w.r.t. including CUDA happening soon (hopefully) ...
- EasyBuild 4.4.0 release \o/

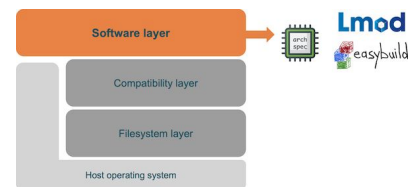
# EasyBuild 4.4.0: what's relevant for EESSI



- Support for checking for unwanted linking to libraries by registering “banned” libraries
  - Allows for checking for accidental linking to OS libraries from build host
  - Can also check for linking with *required* libraries via same mechanism (`libc.so` in compat layer?)
- Support for `--sanity-check-only` (easy smoke testing of existing software installations)
  - Should be doable to leverage this via ReFrame by using EasyBuild as a library...
- `foss/2021a` toolchain with FlexiBLAS to allow runtime switching to different BLAS/LAPACK libraries
- Support updating of specific build options after initializing the EasyBuild configuration
- Fixes for `eb --module-only` - relevant to create other/custom “views” on the provided software
- Support for prepending custom library paths in RPATH section via `--rpath-override-dirs`
- Support for using EasyBuild on a system with more than 1,024 cores :)



# EasyBuild 4.4.0: TODOs related to EESSI



- Patching of CMake to make it aware of compatibility layer  
<https://github.com/easybuilders/easybuild-easyblocks/pull/2248>
- Make CMakeMake generic easyblock aware of `--sysroot` configuration option  
<https://github.com/easybuilders/easybuild-easyblocks/pull/2247>
- correctly determine path to active binutils in TensorFlow easyblock  
<https://github.com/easybuilders/easybuild-easyblocks/pull/2218>
- Failing numpy tests on aarch64 (bug in OpenBLAS?)  
<https://github.com/easybuilders/easybuild-easyconfigs/issues/11959>
- Broken installation of TensorFlow 2.4.1 with foss/2020b on aarch64  
<https://github.com/easybuilders/easybuild-easyconfigs/pull/12667>
- Better support for easystack files...

# EESSI pilot repository

<https://eessi.github.io/docs/pilot>

**NOT FOR  
PRODUCTION USE!**



## 2021.03 version of pilot software stack

Current status:

***2020.12 pilot version was removed!***

- Compatibility layer in place for `x86_64 + aarch64`  
(ppc64le on hold due to Gentoo Prefix bootstrap issue)
- Target CPUs:
  - `{aarch64,x86_64}/generic`
  - `intel/{haswell,skylake_avx512},amd/zen2,aarch64/graviton2`
- Software: Bioconductor (R), GROMACS, OpenFOAM, TensorFlow, Spark, IPython, **Horovod, QuantumESPRESSO, ...**
- Demo scripts (incl. Script to do native installation of CernVM-FS): <https://github.com/EESSI/eessi-demo>
- GPU installations: on hold (cfr. discussion with NVIDIA on CUDA)

[Kenneth]

# EESSI pilot repository

<https://eessi.github.io/docs/pilot>

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**Next pilot version: 2021.06?**

Goals:

- Linux only, same CPU targets, same software applications
- Use new container image for build nodes
- Software installations with more recent compiler toolchain?
- Look into automating ingestion of software installations from build node to Stratum 0 via S3 bucket
- Also run smoke tests on node different from build node? (`eb --sanity-check-only`)
- Look into GPU builds of GROMACS, TensorFlow  
(once discussion with NVIDIA w.r.t. CUDA has been settled)
- **We need helping hands to tackle small parts of this!**

[Kenneth]

# Testing with ReFrame



## Discussed ReFrame 'library tests'

- Separate tests into test-specific (in library test) and system specific (derives from library test) parts. E.g.
  - Sanity pattern = test specific
  - Number of tasks per node = system specific
- Library test != turn-key test suite, but EESSI requires turn-key test suite... We will need to implement the 'system-specific' part too, but 'generically'.
  - EESSI goal: limit all system-specific things to ReFrame config
  - E.g. set number of tasks per node based on num\_cpus in ReFrame config

# Testing with ReFrame



Discussed ReFrame ‘library tests’

- We plan to adopt this structure.

Benefits for EESSI:

- Provides structure in designing tests
- Library test (also) maintained by ReFrame community
- Practical: will initially develop in EESSI software-layer GitHub (or in separate repo?)

Keep library tests and derived tests.

- Library tests: in e.g. tests/ReFrame/libtests/...
- Derived tests: in e.g. tests/ReFrame/eessi/...
- Future: libtest will be moved/PR-ed to ReFrame (or separate) repo.

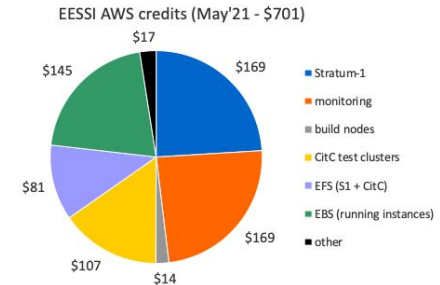
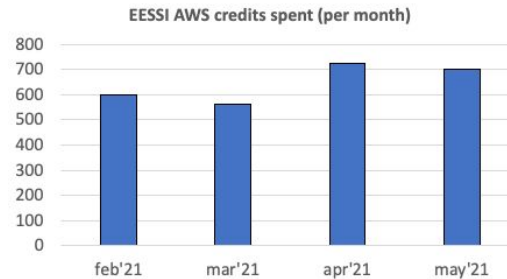
# Update on sponsorship by Azure/AWS



- Sponsored credits (\$25,000) are being put to good use!
- **Ask in #aws-resources Slack channel to get access!**
- In May'21: ~\$701 worth of credits spent on Stratum-1, monitoring node, EB testing, ...
- ~\$2600 spent in total



- Ball is rolling!
- Azure is actively looking into if/how they can sponsor EESSI (via SURF - RUG)
- Probably more news about this soon...



# AWS infrastructure: status



- Monitoring server up and running
  - Idea is to use Prometheus to monitor services/machines
  - First step: monitor the Stratum 0/1 servers using custom Prometheus metrics
- S3 bucket for software and compatibility layer up and running
  - Publicly readable, writable for EESSI AWS accounts and from infra nodes
  - `eessi-upload-to-staging eessi-2021.03-software-linux-zen2-1622000000.tar.gz`

# EESSI paper



## **EESSI: A cross-platform ready-to-use optimised scientific software stack**

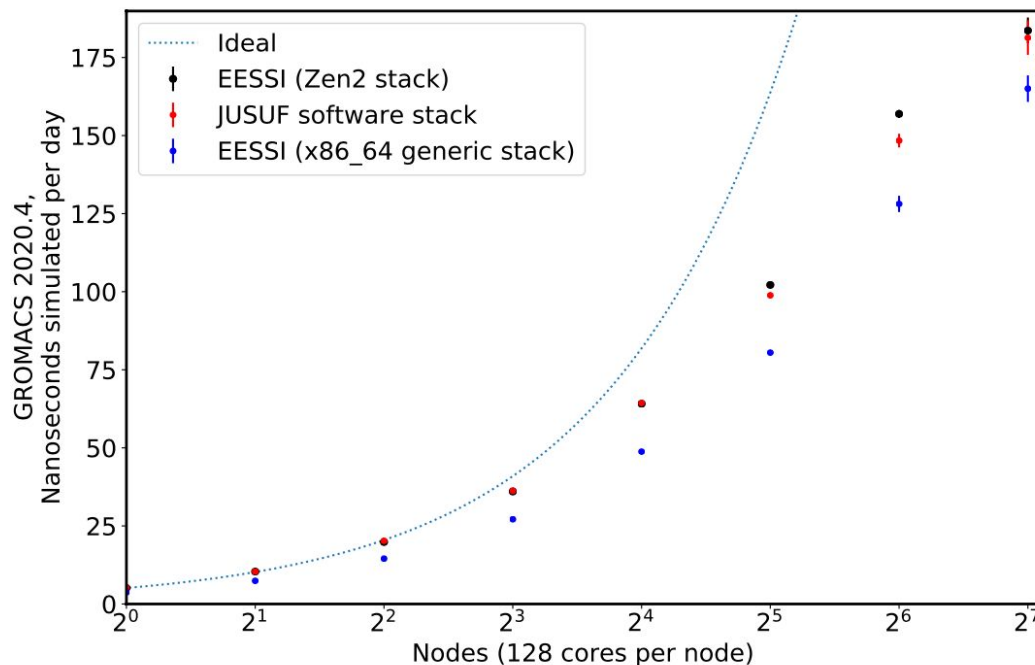
**Submitted** to special issue *New Trends in High Performance Computing: Software Systems and Applications* in *Software: Practice and Experience*<sup>1</sup>

- Aim to have a publication which we can cite: presentations, project proposals, ...
- Covering what works in the pilot (layers), discussing use cases, performance evaluation, ideas on testing and future work
- Authors: Bob, Victor, Kenneth, Alan, Caspar, Thomas
  - Thanks to Adam for proofreading!
- If you're interested in reading the paper, contact Thomas (thomas.roblitz@uib.no)

<sup>1</sup><https://onlinelibrary.wiley.com/pb-assets/assets/page/journal/1097024x/SPE-SI-HPC-1607014410373.pdf>



# EESSI paper - GROMACS performance



Large-scale (up to 16k cores) performance test with GROMACS on JUSUF @ JSC  
**EESSI is competitive with system installation of GROMACS!**

# NESSI update from Norway



- EESSI pilot available via native CernVM-FS on HPC cluster Saga in Norway
  - CentOS 7.9, Intel Skylake, ~ 16k cores, Infiniband
  - Next cluster: Fram (Broadwell, ~ 32k cores)
- Work in progress: module to make EESSI accessible
- Work in progress: monitoring instance
- Work in progress: automation of build & ingest procedure
- Starting work on risk analysis & mitigation measures
- Starting work on building packages on top of EESSI

# Upcoming events



- **Half-day EasyBuild tutorial at ISC'21**
  - Kenneth (HPC-UGent), Alan (JSC), Maxime (Compute Canada)
  - Fri June 25th 2021, 2pm - 6pm CEST
  - <https://www.isc-hpc.com/tutorials-2021.html>
  - **If you're attending ISC'21, please join us!**
  - Session will be recorded and available publicly shortly afterwards...
- **AWS Arm-HPC hackathon** (*not directly related to EESSI, yet...*)
  - Virtual, week of July 12-16 2021
  - **An Apple M1 Macbook per team member for the winning team!**
  - Using Spack + ReFrame
  - <https://aws.amazon.com/blogs/hpc/aws-arm-hpc-hackathon-2021>