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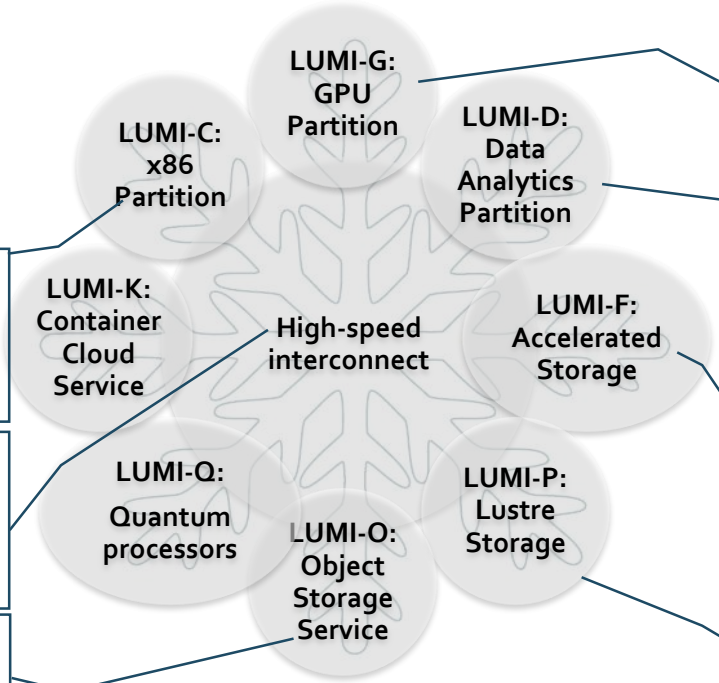
11TH EGU GALILEO CONFERENCE
Solid Earth and Geohazards in the Exascale Era

LUMI in a nutshell

LUMI

1 SYSTEM
375 Petaflop/s
SUSTAINED COMPUTING POWER

118 PB
STORAGE



Tier-0 GPU partition: 10,240 AMD Instinct MI250X GPUs

Interactive partition with 32 TB of memory and graphics GPUs for data analytics and visualization

8 PB Flash-based storage layer with extreme I/O bandwidth of 2 TB/s and IOPS capability. Cray ClusterStor E1000.

80 PB parallel file system

Supplementary CPU partition, ~200,000 AMD EPYC CPU cores

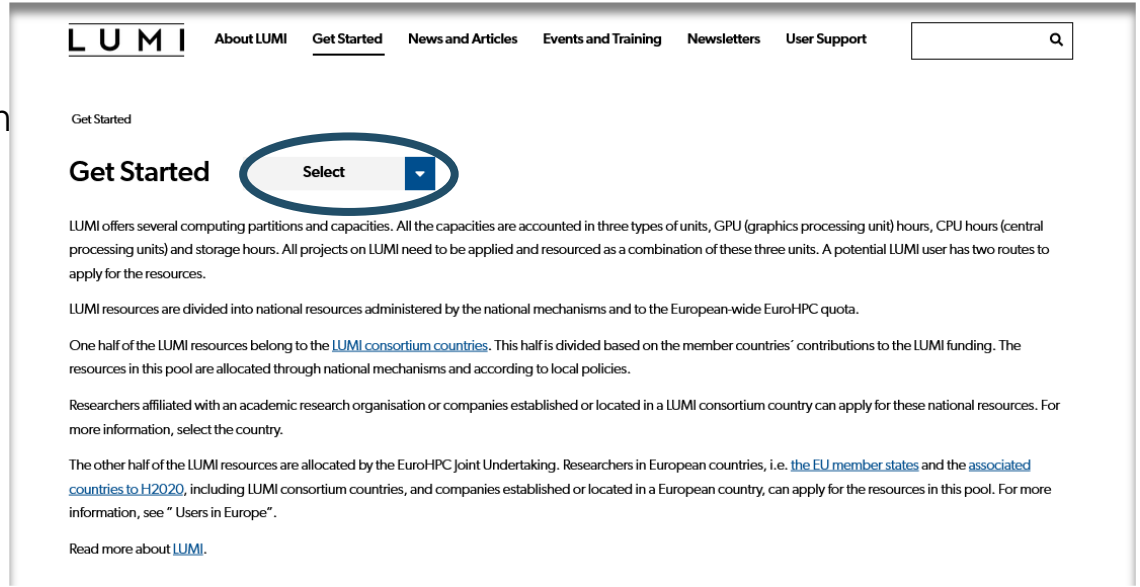
Possibility for combining different resources within a single run. HPE Slingshot technology.

30 PB encrypted object storage (Ceph) for storing, sharing and staging data

LUMI national access

https://lumi-supercomputer.eu/get-started

- Consortium share through national calls
  - Select specific consortium member country



LUMI national access

- Consortium share through national calls
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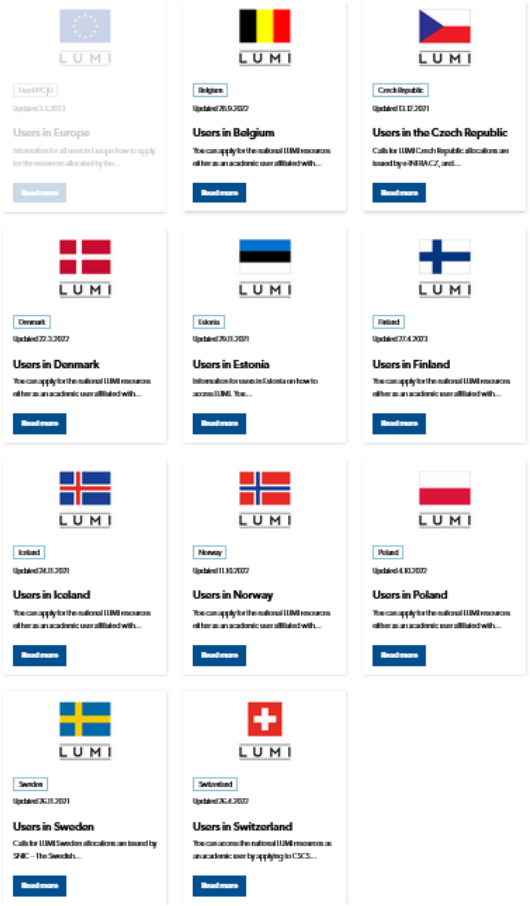
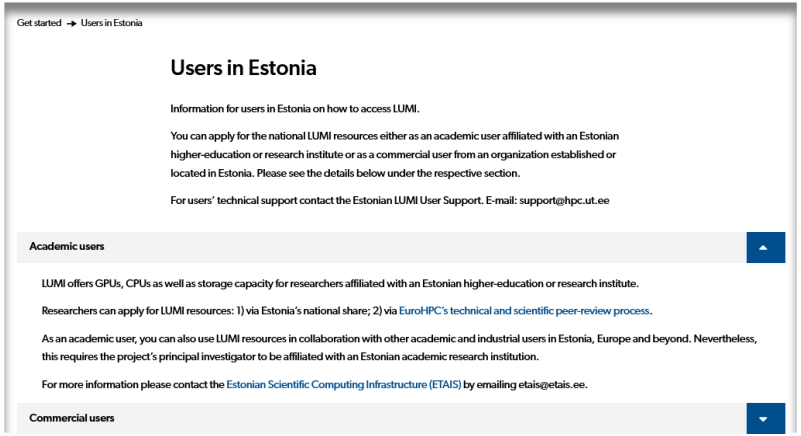
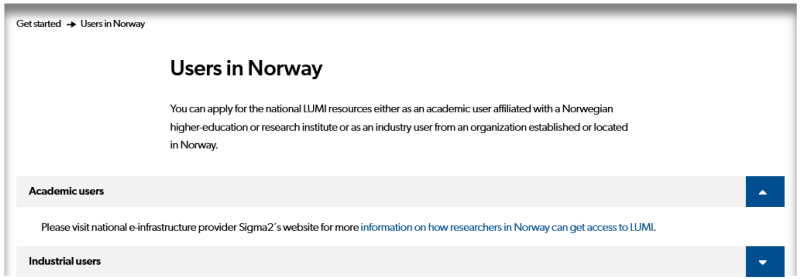
  - Or directly access from list below



LUMI national access

- Consortium share through national calls
  - Select specific consortium member country
  - Or directly access from list below
  - Differs between consortium countries





LUMI national access

- Consortium share through national calls
  - Select specific consortium member country
  - Or directly access from list below
  - Differs between consortium countries
  - Benchmark, development and regular are continuous
  - Extreme/GC are separate calls

Users in Finland

You can apply for the national LUMI resources either as an **academic user** affiliated with a Finnish higher-education or research institute or as an **industry user** from an organization established or located in Finland.

When applying for the Finnish resources, there are four different **access modes** to choose from:

Regular Access mode, for resource applications with a case to enable progress of science in the domains covered. These applications are expected to be able to justify the need for large allocations in terms of compute time, data storage and support resources because they are significantly contributing to the progress of science in their domain.

- middle size projects, duration fixed 12 months
- max 8 million core-h, 0.5 million GPU-h, 570 000 TiB-h

Benchmark Access mode is meant for users to collect GPU performance data on LUMI in order to document the technical feasibility of their proposals to be submitted to LUMI Extreme Scale Access calls.

- to show readiness for Extreme Scale Access in LUMI-G (cf. PRACE preparatory access), duration fixed 3 months
- max 0.5 million core-h, 0.05 million GPU-h, 22 000 TiB-h

Development Access mode is meant for projects focusing on code and algorithm development and developing a science portal or other infrastructure software components.

- minor projects to develop software for LUMI, duration 1 year, extendable for other years
- max 1 million core-h, 0.1 million GPUh, 90 000 TiB-h

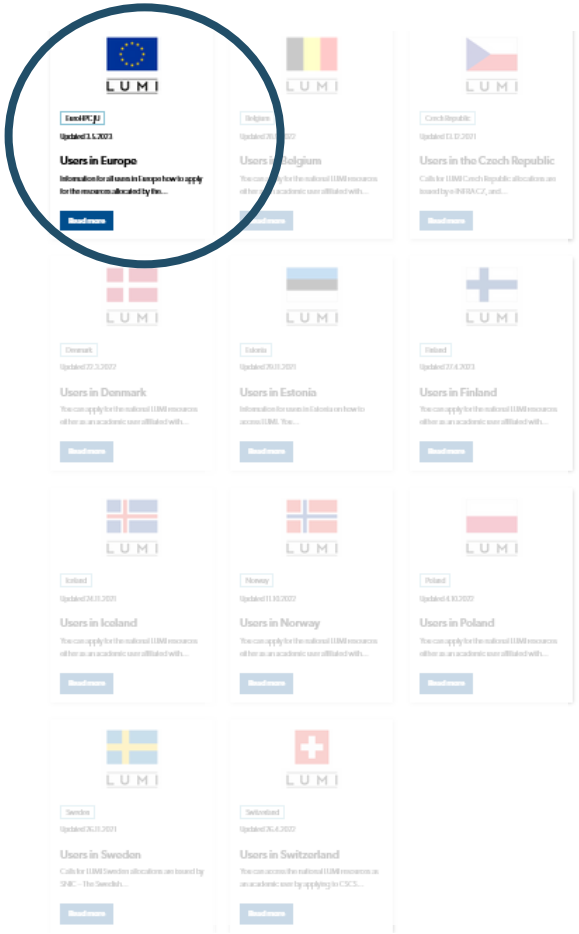
Extreme Scale Access is a high-impact, high-gain innovative research, open to all fields of science justifying the need for the capacity to use extremely large allocations in terms of compute time (especially GPU) and data storage resources.

- largest projects using especially GPUs (LUMI-G), duration fixed 12 months
- 50% of Finnish LUMI GPU resources, 25% of Finnish CPU resources
- 0.5–3 million GPU-h, max 16 million CPU core-h
- calls for projects once a year

https://lumi-supercomputer.eu/get-started

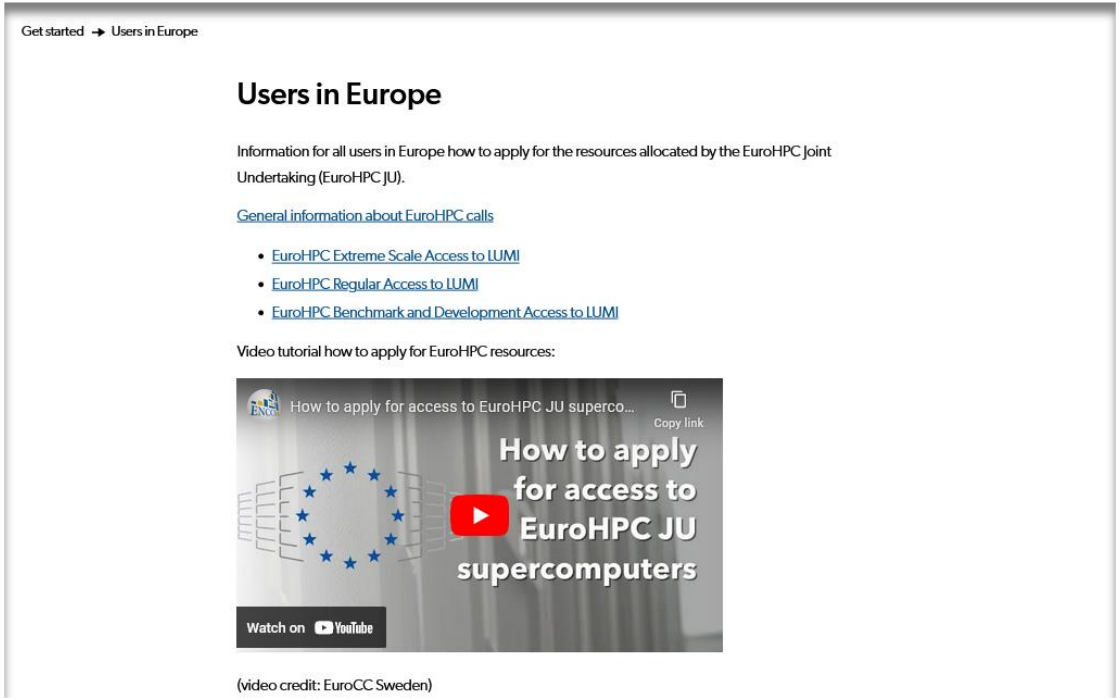
LUMI European access

- EuroHPC JU access
  - Sub-link users-in-europe
  - Or select from list



LUMI European access

- EuroHPC JU access
  - https://lumi-supercomputer.eu/get-started-2021/users-in-europe
- EuroHPC JU access policy
  - to users established in the Union or a country associated to Horizon 2020
  - primarily based on open calls
  - exceptional cases such as strategic European initiatives or in emergency and crisis management situations



LUMI European access

Benchmark & development

- Continuous proposal submission
- Low threshold
- Cut-off date is first of month
  - Administrative validation: 2 days
  - Review & decission: 2 weeks
  - Access: latest after 3 weeks

System	Architecture	Site (Country)	Benchmark	Development
LUMI-C	HPC Cray EX	CSC (FI)	✓	✓
LUMI-G	HPC Cray EX	CSC (FI)	✓	✓
Vega CPU	BullSequana XH2000	IZUM Maribor (SI)	✓	✓
Vega GPU	BullSequana XH2000	IZUM Maribor (SI)	✓	✓
Karolina CPU	HPE Apollo 2000 Gen10 Plus, x86_64	IT4I VSB-TUO (CZ)	✓	✓
Karolina GPU	HPE Apollo 6500 Gen10 Plus, Nvidia GPGPU	IT4I VSB-TUO (CZ)	✓	✓
Discoverer	Atos BullSequana XH2000	Bulgaria	✓	✓
MeluXina CPU	Atos BullSequana XH2000	Luxembourg	✓	✓
MeluXina GPU	Atos BullSequana XH2000	Luxembourg	✓	✓
MeluXina FPGA	Atos BullSequana X430 A5	Luxembourg	✓	✓

https://prace-ri.eu/hpc-access/eurohpc-access/eurohpc-ju-benchmark-development-access-calls/ (May 11th 2023)

LUMI European access

Regular Access

- Current call:
  - Cut-off July 7
  - Allocations from November 1
  - Access for single year
  - Next call: November 3
- PI can only have one regular access via EuroHPC
- Consortium and EuroHPC calls are not exclusive!

EuroHPC JU Call for Proposals for Regular Access Mode – 2023-07-07 Cutoff

Types of Access: EuroHPC Regular Access

Opening Date: 07/04/2023 @ 10:00 **Luxembourg Time**

Closing Date: 07/07/2023 @ 10:00 **Luxembourg Time**

Time until call closes: 56 Days, 20 Hours, 1 Minutes, 55 Seconds.

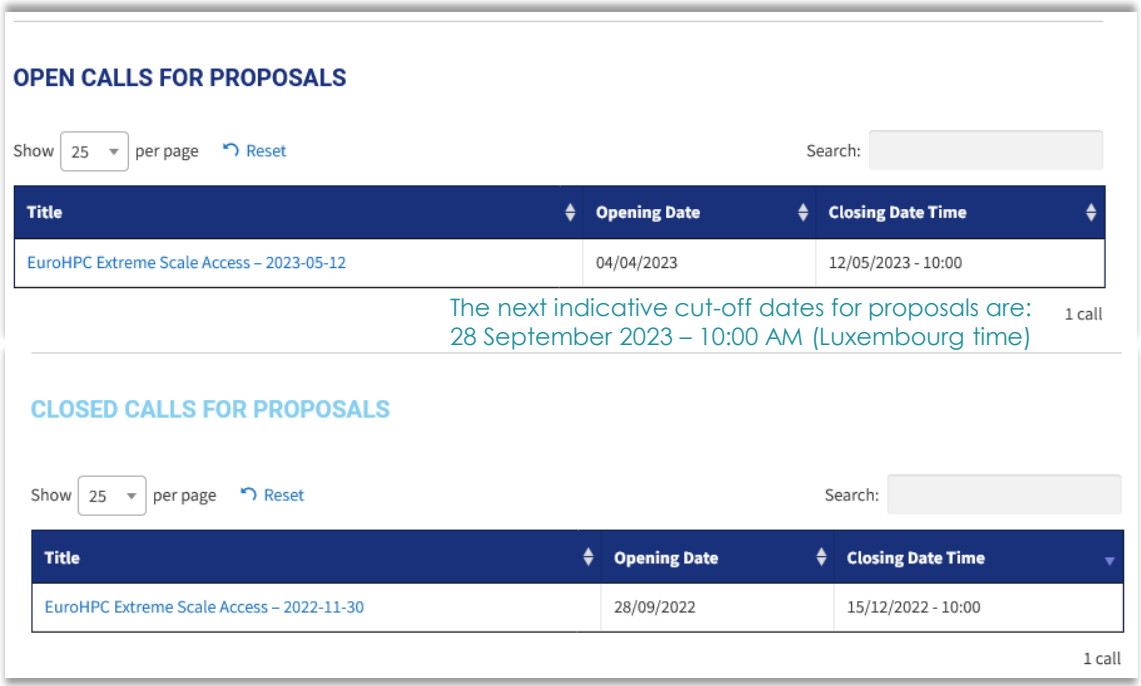
System	Architecture	Site (Country)	Total resources offered (node hours)	Total resources offered (core hours)	Minimum resources request (node hours)	Minimum resources request (core hours)
LUMI-C	HPE Cray EX	CSC (FI)	376,719	48,220,033	37,000	4,736,000
LUMI-G	HPE Cray EX	CSC (FI)	738,665	47,274,560	50,000	3,200,000

https://prace-ri.eu/call/eurohpc-ju-call-for-proposals-for-regular-access-mode-2023-07-07-cutoff/ (May 11th 2023)

LUMI European access

Extreme Scale Access

- Open to all fields (science, industry, public sector)
- EU Member State or in a country associated with Horizon 2020.
- PI has an employment contract in the organization + 3 month after allocation ends
- Companies: solely for open R&D purposes.



OPEN CALLS FOR PROPOSALS

Show 25 per page Reset Search:

Title	Opening Date	Closing Date Time
EuroHPC Extreme Scale Access – 2023-05-12	04/04/2023	12/05/2023 - 10:00

The next indicative cut-off dates for proposals are:
28 September 2023 – 10:00 AM (Luxembourg time)

1 call

CLOSED CALLS FOR PROPOSALS

Show 25 per page Reset Search:

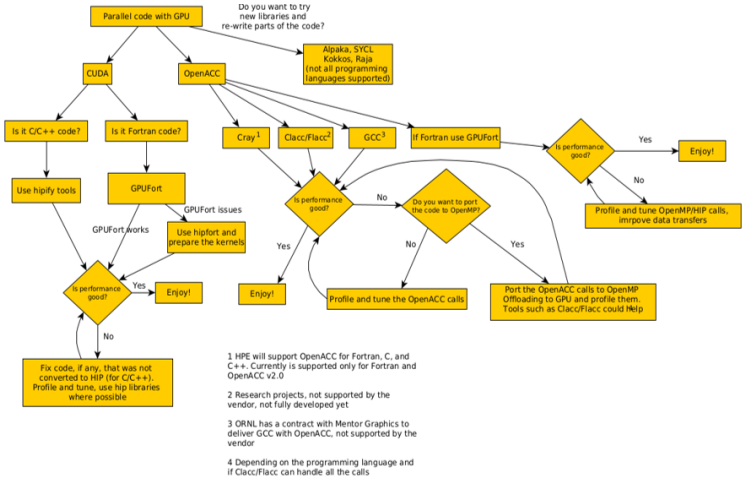
Title	Opening Date	Closing Date Time
EuroHPC Extreme Scale Access – 2022-11-30	28/09/2022	15/12/2022 - 10:00

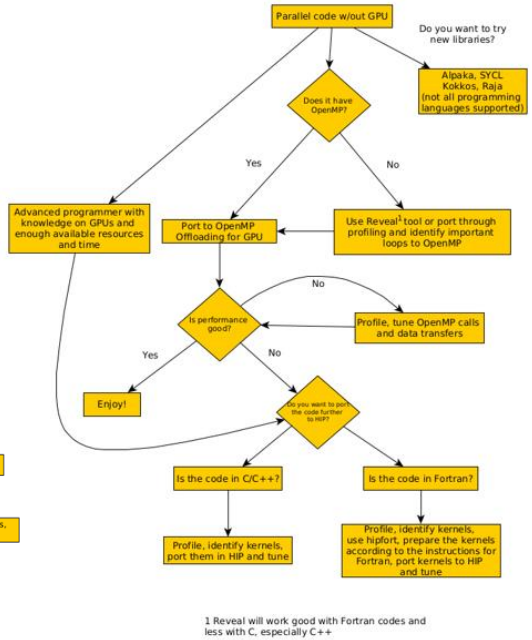
1 call

https://prace-ri.eu/hpc-access/eurohpc-access/eurohpc-extreme-scale-access/ (May 11th 2023)

LUMI GPU programming

- CUDA/HIP
  - C++
  - Fortran with C++ kernels
  - Hipify or e.g. header based CUDA <-> HIP portability
- OpenMP
  - C/C++
  - Fortran
- OpenACC
  - Fortran only
- Kokkos, SYCL
  - C++





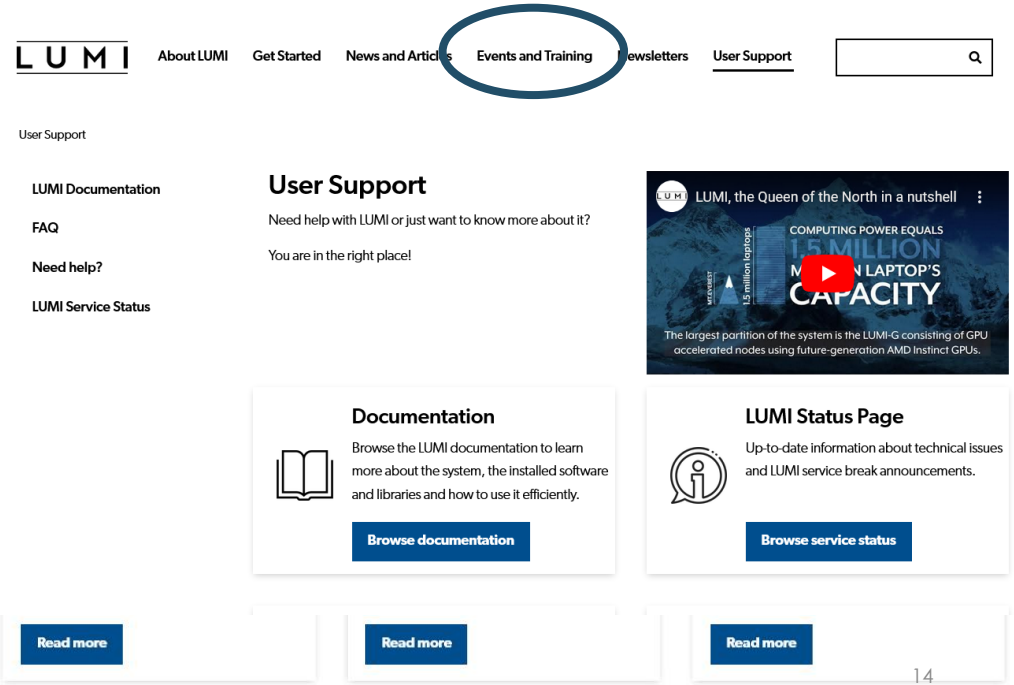
LUMI software & installations

- Software list
  - https://lumi-supercomputer.github.io/LUMI-EasyBuild-docs/
  - CSC local installations
    - Amber
    - Elmer
    - OpenFOAM
    - PALM
    - PyTorch
    - TensorFlow
- Installations
  - …

LUMI support

- General information
  - lumi-supercomputer.eu
- Training & events
  - lumi-supercomputer.eu/events
- Documentation
  - docs.lumi-supercomputer.eu
- LUMI User Support Team
  - lumi-supercomputer.eu/user-support/need-help

  Emanuel Ory:
  emanuel.ory@csc.fi



LUMI

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EuroHPC Joint Undertaking

The acquisition and operation of the EuroHPC supercomputer is funded jointly by the EuroHPC Joint Undertaking, through the European Union's Connecting Europe Facility and the Horizon 2020 research and innovation programme, as well as the Participating States FI, BE, CH, CZ, DK, EE, IS, NO, PL, SE.

Leverage from the EU 2014–2020

European Union
European Regional Development Fund

REGIONAL COUNCIL OF KAINUU

EURO