Federation Platform

Federated Software Catalog

23 April 2026

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Ghent University

https://my-eurohpc.eu

The EuroHPC Federation Platform (EFP)

"A one-stop-shop for accessing and utilizing EuroHPC systems and services"

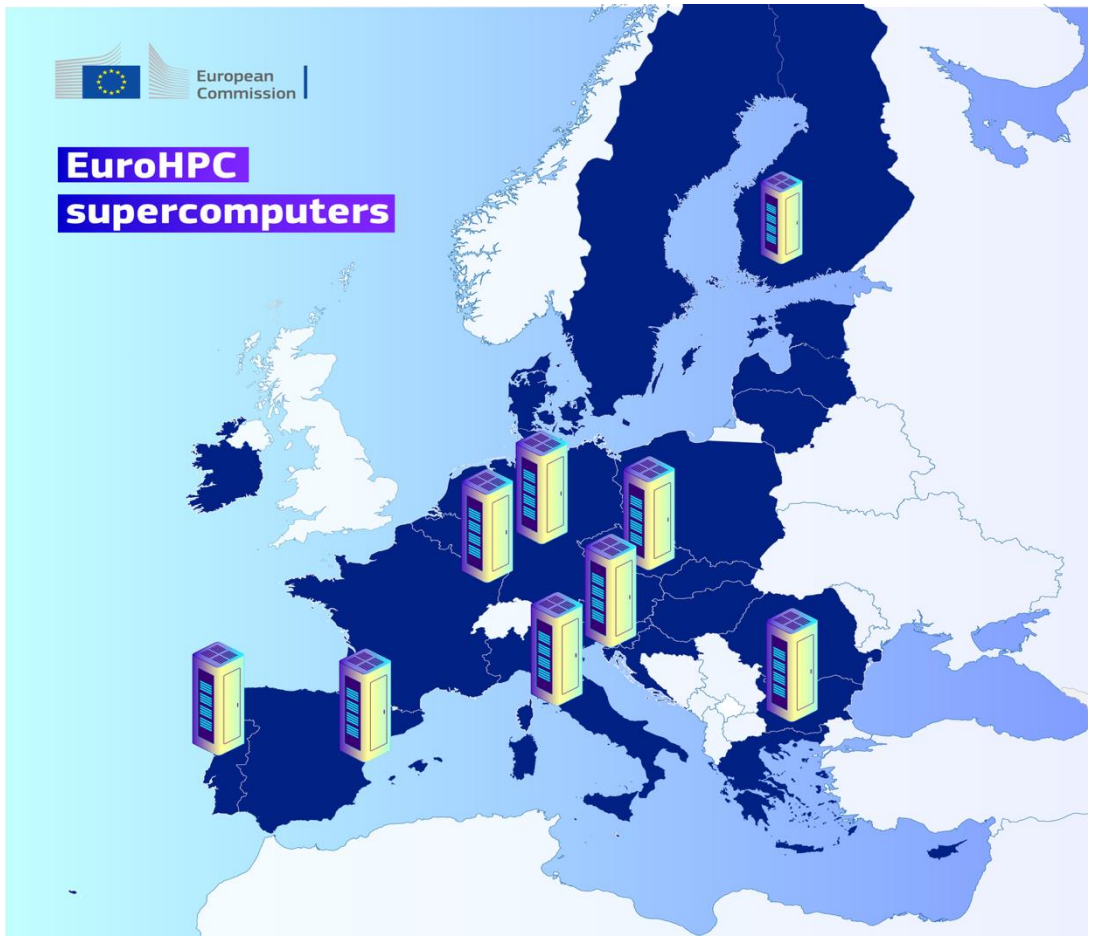
A platform and federation framework which provides **a streamlined, single point of onboarding** and via which user can **access all systems and services** available to them in the EuroHPC ecosystem.

Direct access | Interactive interfaces | Programmatic APIs | Unified software stack

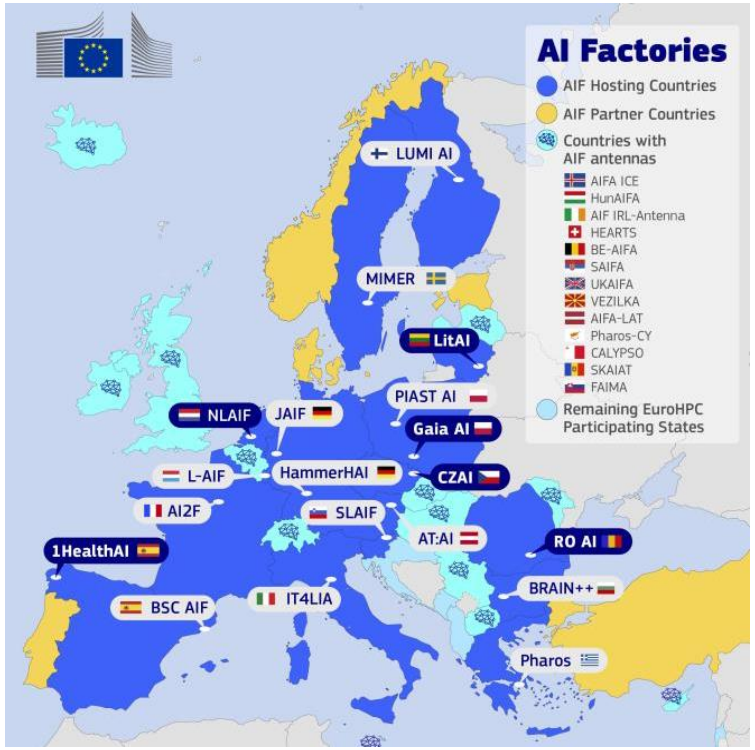
EuroHPC Joint Undertaking

Federation Platform

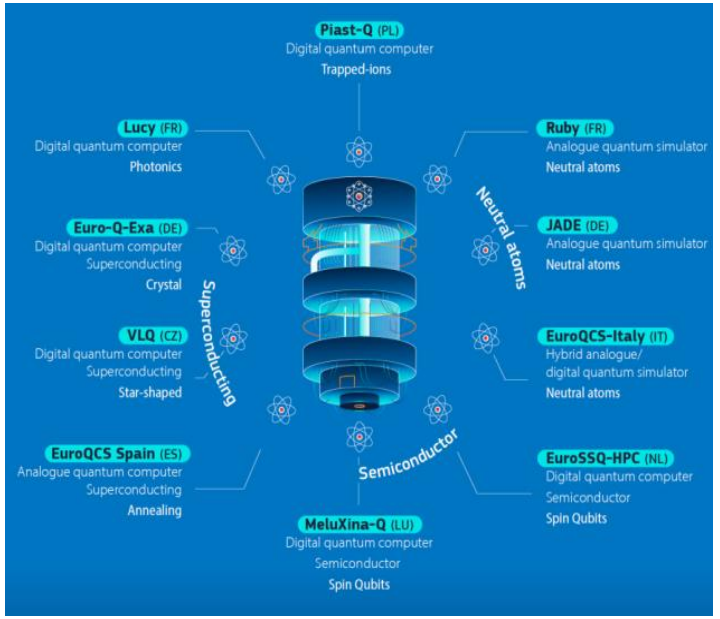
EFP Target Systems



Alice Recoque, Arrhenius, DAEDALUS, Deucalion, Discoverer, JUPITER, Karolina, Leonardo, LUMI, MareNostrum 5, MeluXina, Vega, ...



- BSC AIF, HammerHAI, IT4LIA, LUMI AIF, Meluxina-AI, MIMER, Pharos
- AI2F, AIF Austria, BRAIN++, JAIF, PIAST AIF, SLAIF
- ...



Euro-Q-Exa, EuroQCS-France, EuroQCS-Italy, EuroQCS-Spain, EuroQCS-Poland, VLQ, ...

What will we cover

- Introduction to the EuroHPC Federation Platform and its components
- Deeper dive into EFP Federated Software Catalog (FSC) which is based on EESSI
  - User experience
  - Current status: available software, supported CPUs & GPUs
  - Ongoing work
  - Availability of Federated Software Catalog on EuroHPC supercomputers
  - Live demo with GROMACS on EuroHPC system
  - Adding software to EFP FSC
  - What about performance?
- Getting help

EFP Main Features

Federated identity and Single-Sign-On (SSO)

Users utilize the same login and identity (e.g. granted via their home institution or national identity provider) to authenticate to all services and systems. Process for onboarding Industry.

Resource allocation, management and monitoring across systems

Users can view and manage their allocations and project members across all systems using a single interface.

Interactive web-based usage

with e.g., remote desktop, command line, AI training monitoring and Jupiter notebooks. Ability to launch batch jobs and browse files on the supercomputers.

Federated software catalogue

providing a pre-installed pseudo-uniform software stack on all systems. Advanced discoverability features for available software.

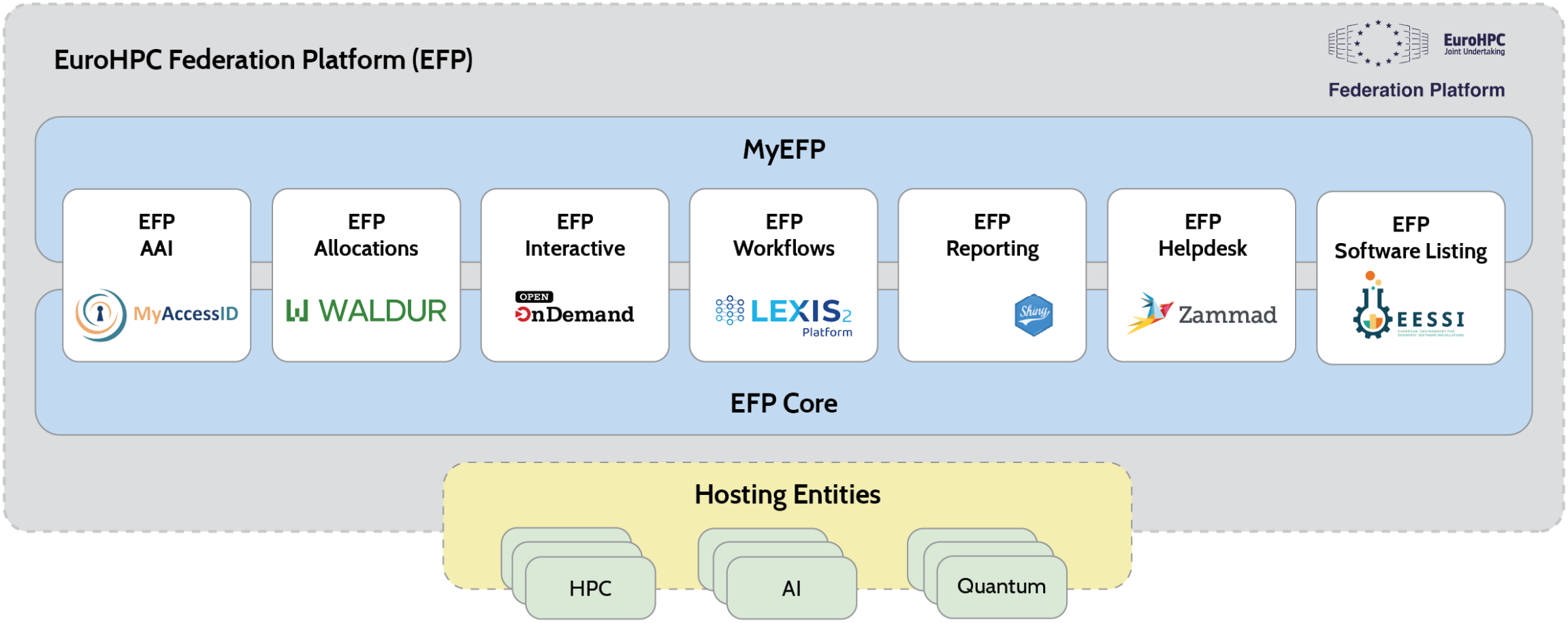
Advanced workflows and data transfer

Workflow execution and data transfers across systems, along with smart scheduling capabilities and high-level graphical interfaces for creating and managing workflows.

Direct access utilizing SSH certificates

Short lived certificates which are obtained via a login flow with Multi-Factor Authentication (MFA) for increased security.

Technologies used for EFP



Contributions to existing open source projects are upstreamed when possible

Impact of EFP on User Journey

Without EFP

1. Apply for a project in the EuroHPC review portal
2. Accepted projects are **manually transferred** to each EuroHPC system
3. User is invited to complete a **separate registration process** at each EuroHPC system
4. User uses **separate portal and credentials** to access and manage project at each EuroHPC System

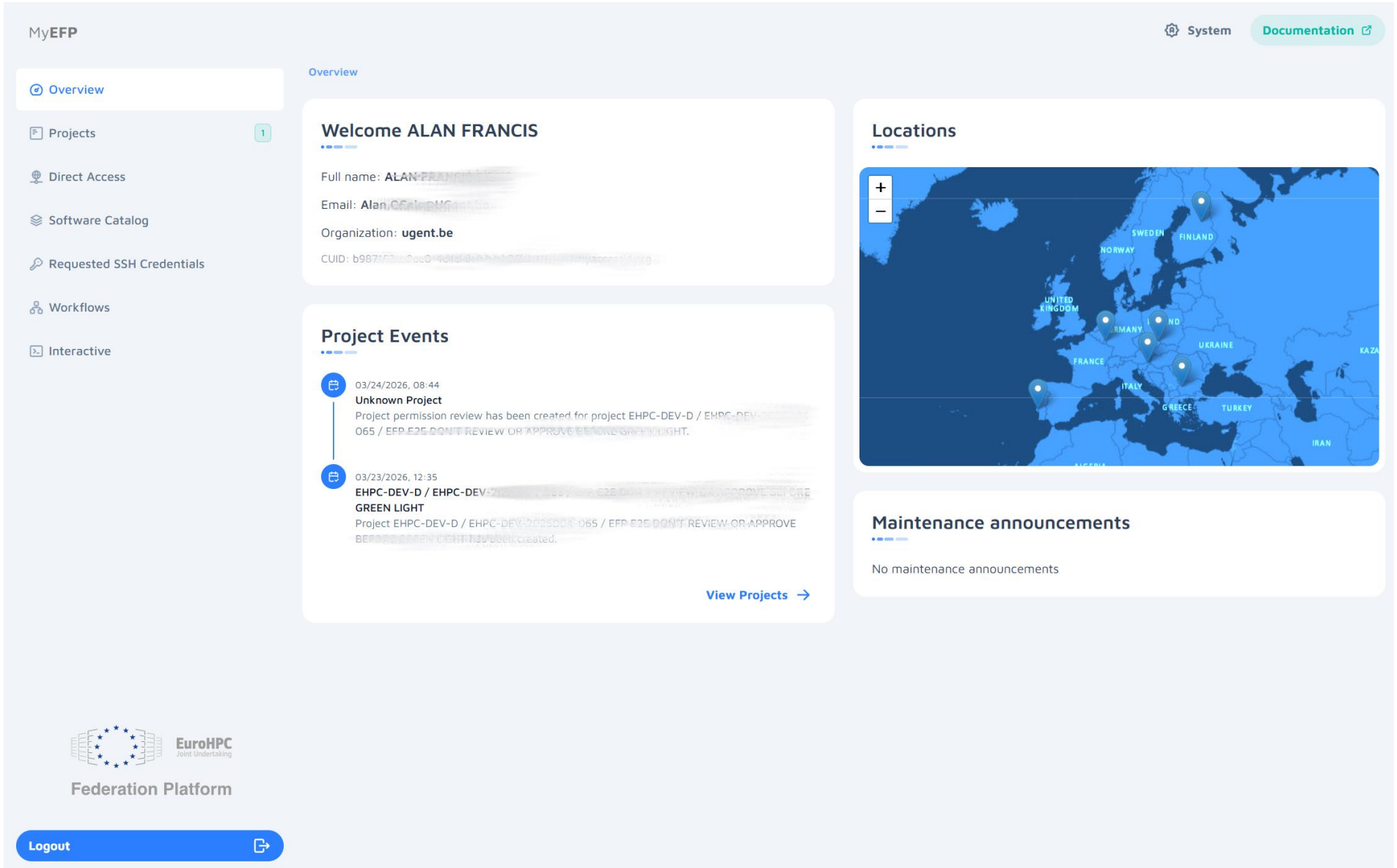
With EFP
(for new EuroHPC projects)

1. Apply for a project in the EuroHPC review portal
2. Accepted projects **automatically flow to the EFP** and to each EuroHPC system
3. User is invited to join a project and **registers through the EFP**
4. User **manages access and projects** using **just the EFP**

There are no changes to the services and capabilities offered by the diverse set of EuroHPC systems.

Onboarding and managing projects across all available systems just becomes much easier through EFP.

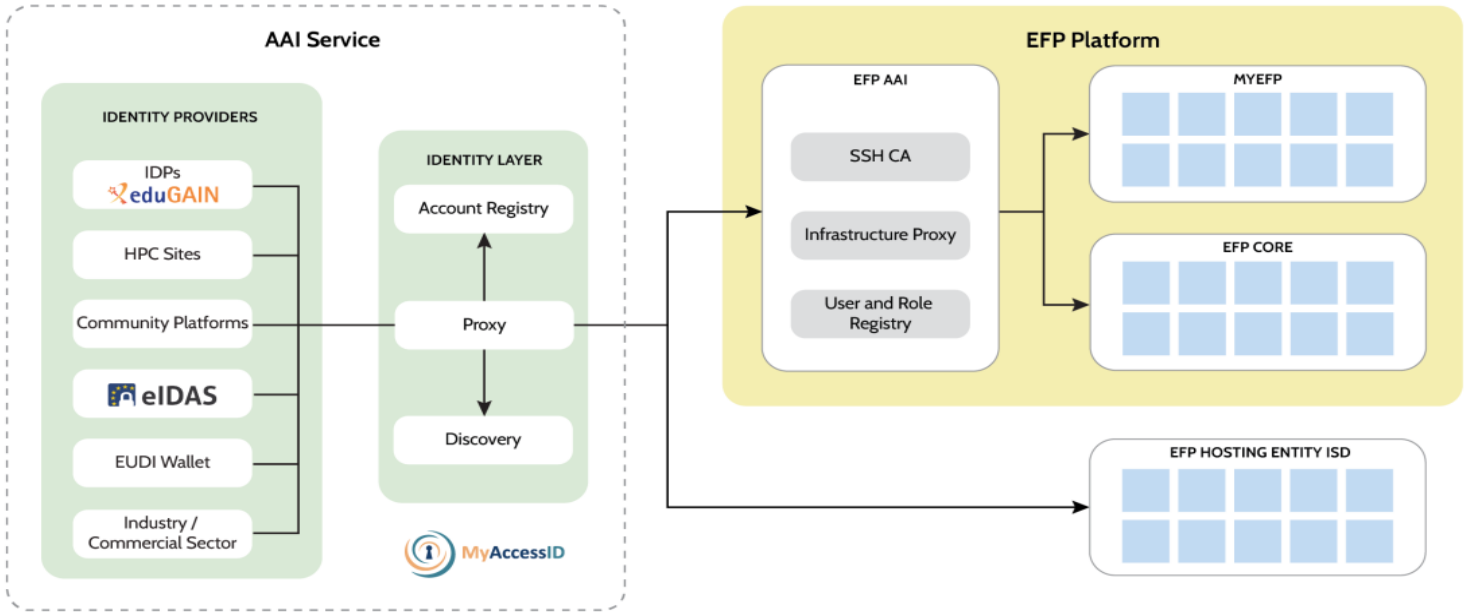
MyEFP: the One-Stop Shop for Accessing EuroHPC Resources

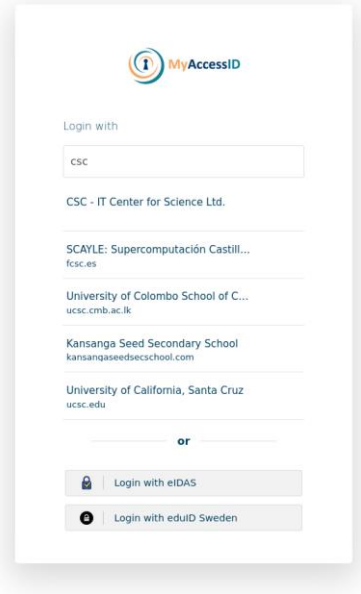


EuroHPC Federation Platform (23 April 2026) | https://my-eurohpc.eu

EFP AAI:

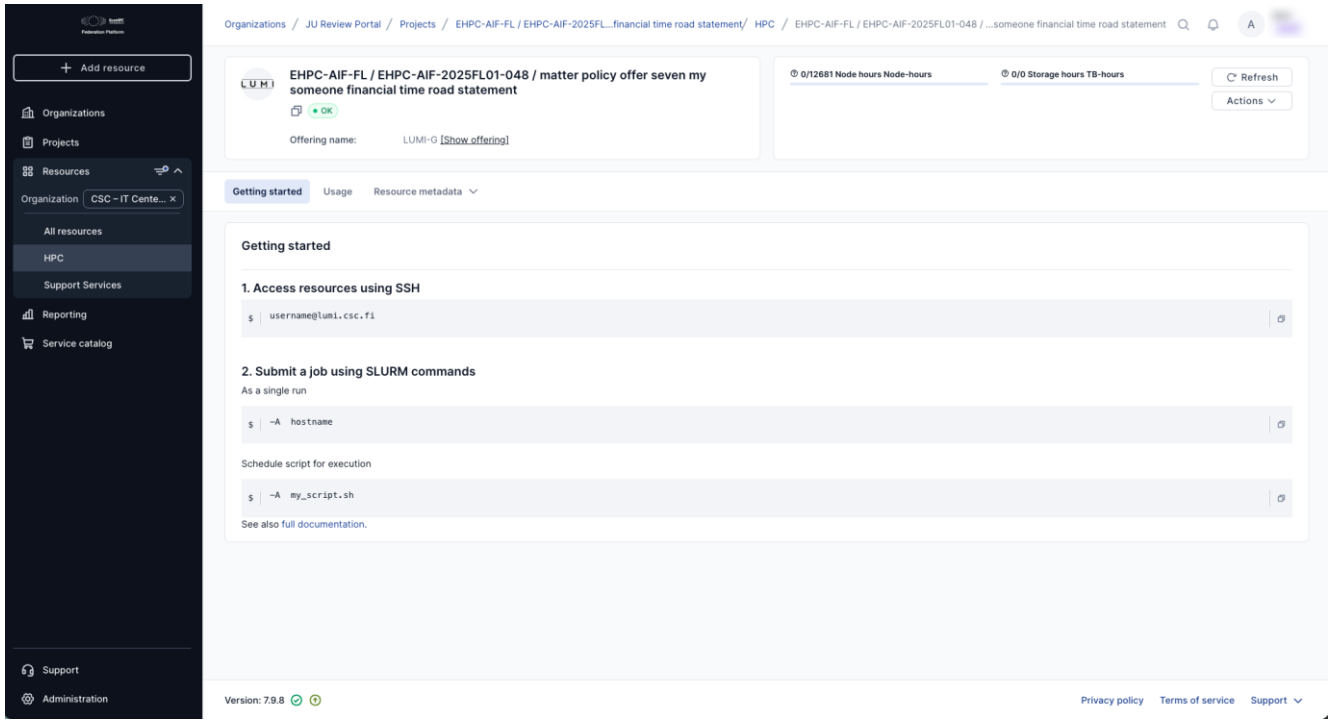
- EFP utilizes **MyAccessID for identity federation**
  - AAI Proxy + Discovery service + Account registry
  - Identity vetting for strong level of assurance
  - Support for national eIDs and users with no institutional login (e.g. industry)
- Short-lived certificates for direct SSH access to the systems
- Identity federation can also be utilized directly independently of the platform





EFP Allocations: WALDUR

- Provides **project-centric dashboards**
- Allows project members to **see and manage** their **allocations**
- Serves **metadata** about the systems and partitions, like login node hostname, username on the system, ...
- Collects & serves information about **maintenance breaks** of EuroHPC systems



Overview of available resources via EFP Allocations

Search... ⌘K

A

+ Add resource

- Organizations
- Projects
- Resources
  - Resources in all visible projects
  - All resources 584
  - HPC 584
  - Support Services
- Reporting
- Service catalog
- Support
- Administration

Resources

Import | Add

Search... | 1 | Export

State: Creating × | OK × | Updating × | + | Clear filters

	Name	Category	Offering	Organization	Project	Created at	State	Actions
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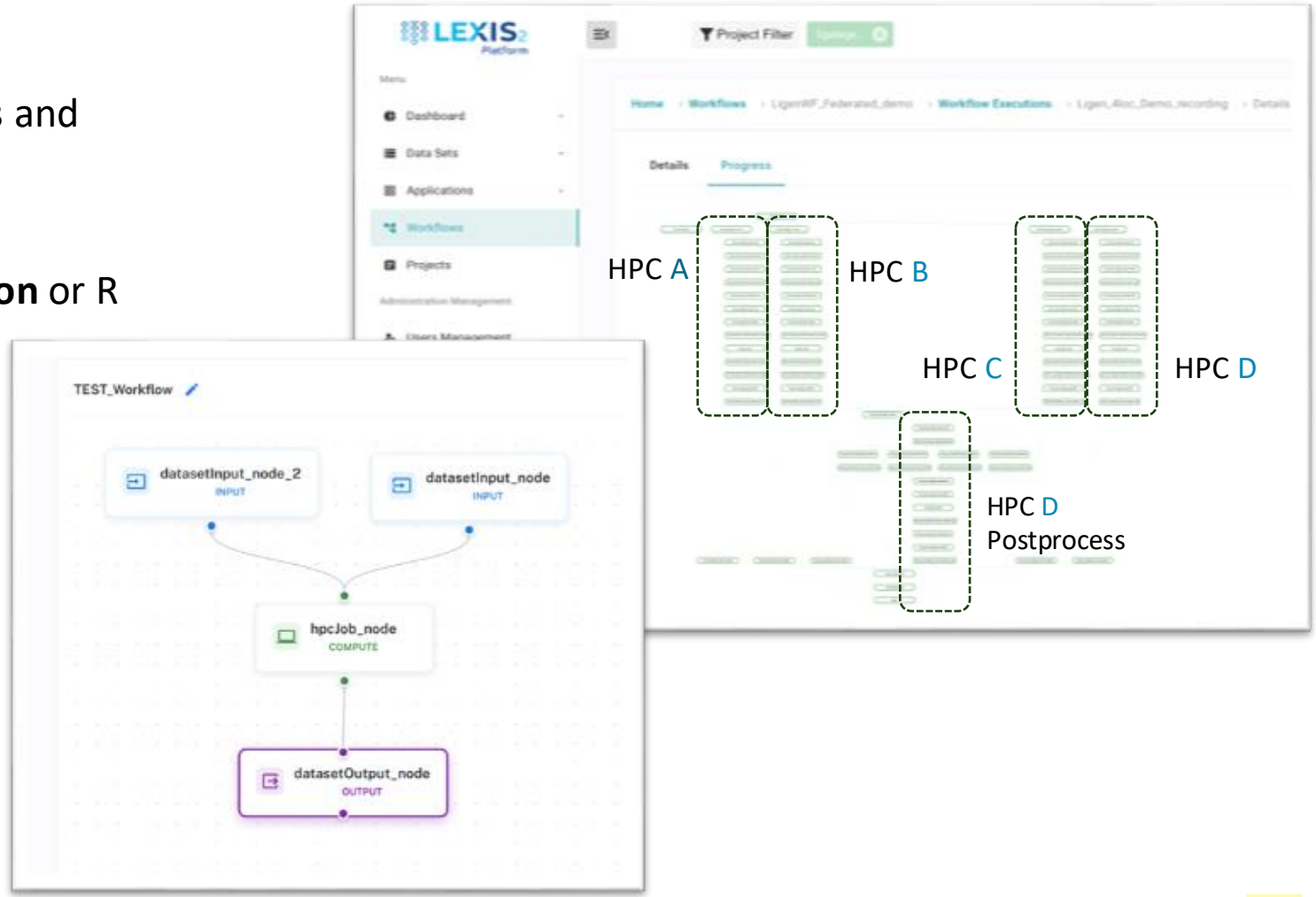
EFP Workflows:

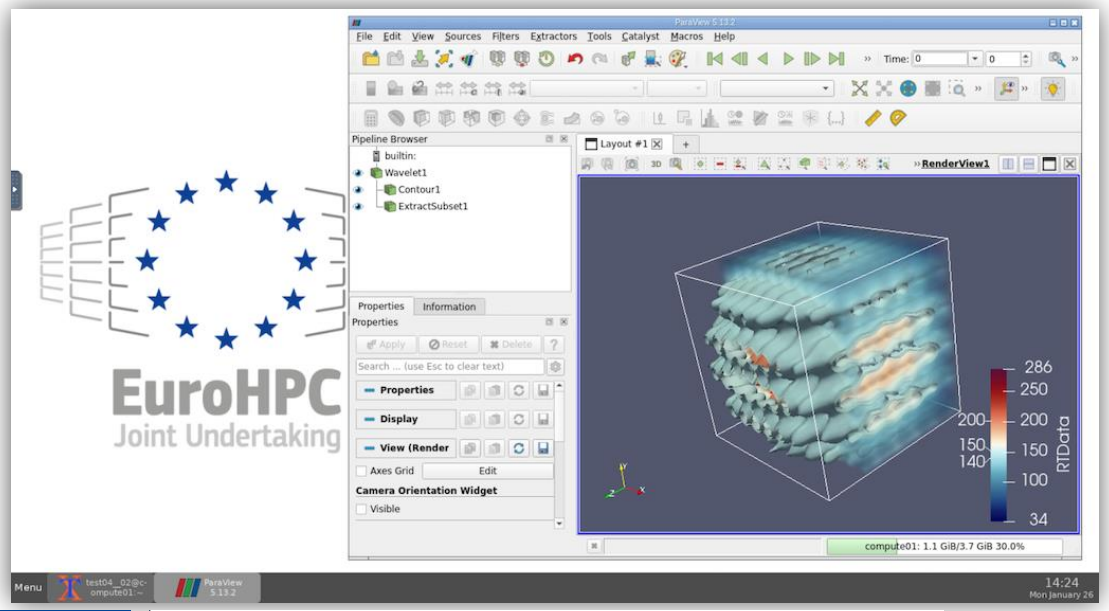
- Easy access **to visually managed workflows** and **distributed data management**
- **API** usage from various languages like **Python** or R
- **Smart scheduling** policies for workflows based on metrics from HPC sites
- Support for **multi-system workflows** (incl. Quantum, AI or Kubernetes)
- **Data staging** from external sources

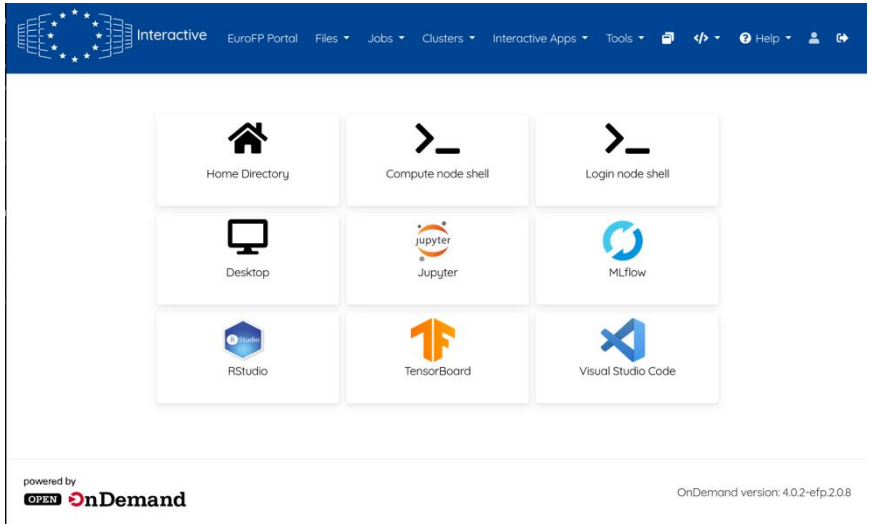


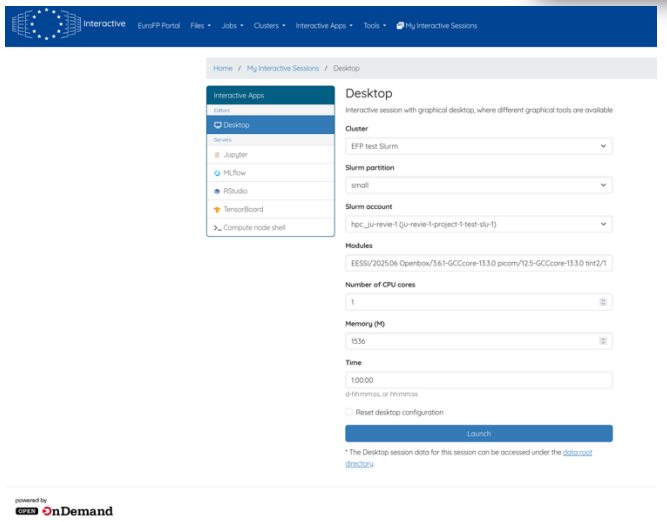
EFP Interactive:

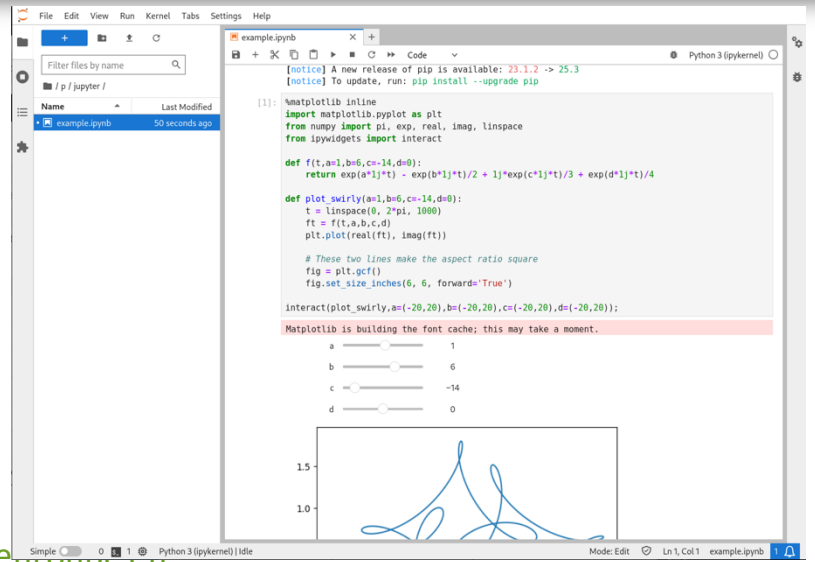
OPEN OnDemand

- Easy to use **web interface** for both new and more advanced users to interactively use the federated resources.
- **Interactive applications** like Jupyter notebooks, remote desktops and shell.
- Supports **job management** and **file management** on the federated resources.



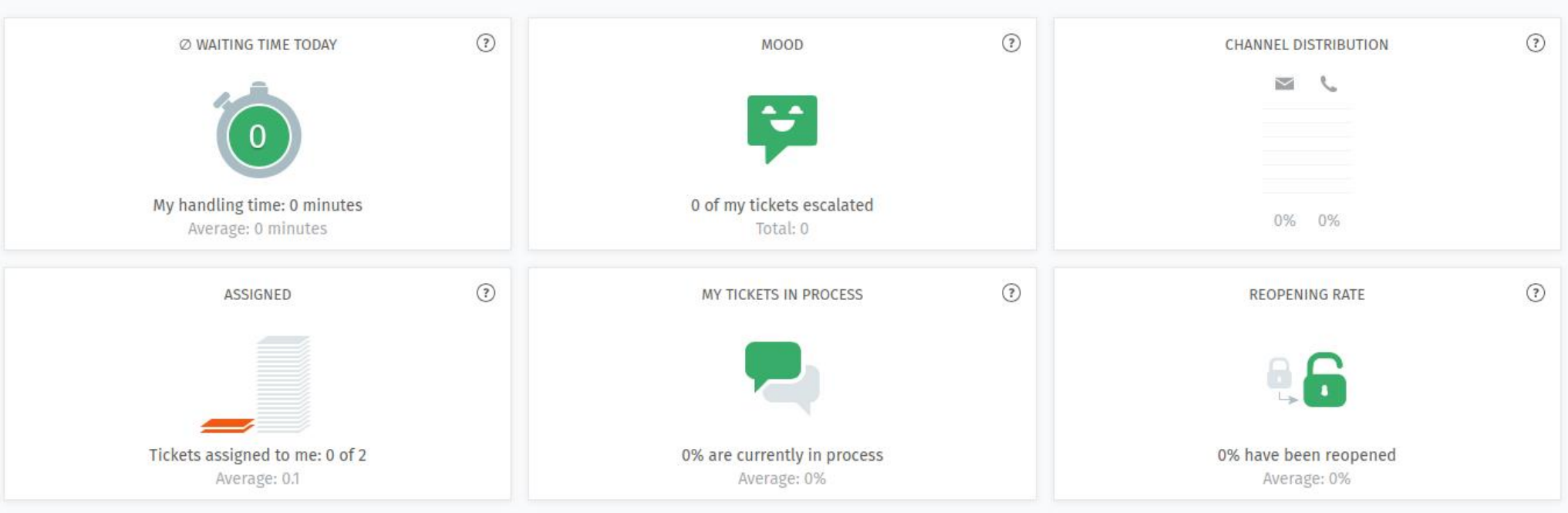






EFP Helpdesk:

Zammad



helpdesk@my-eurohpc.eu

Timeline

- **1st phase (2025 – 2026):** Initial release of EuroHPC Federation Platform
  - First release, April 15th 2026
    - Core functionality
    - Integration with the currently online EuroHPC systems
  - Further improvements planned throughout 2026
    - Updates deployed continuously when ready
    - Integration with new EuroHPC systems
    - Authorization extended to web APIs
    - Smart scheduler
    - Initial connection to other federations
    - Quality and usability improvements

- **2nd phase (2027 – 2029):**
  - Integration with all EuroHPC (HPC, AI, Quantum) systems
  - Improved integration with other federations
  - Advanced features

EFP Federated Software Catalog (FSC)

- **Uniform software stack** for end users
  - Applications, tools, libraries (not system software)
  - Same set of software installations everywhere
  - Identical user workflow **across systems**
- **Available on all EuroHPC systems**

  (alongside existing central software stack)
- Easy to navigate, search, use, …
- Integrated with other components of EFP

  (Interactive, Workflows, MyEFP, …)

European Environment for Scientific Software Installations (EESSI)

EESSI is the base for the EFP Federated Software Catalog

- Started as community project in 2020
- Grew out of EasyBuild community
- Inspired by Compute Canada software stack
- Production repository (software.eessi.io) since 2023
- Developed & supported by MultiXscale EuroHPC CoE since 2023

https://multixscale.eu

https://eessi.io

EESSI as a central software stack for EuroHPC

GROMACS
TensorFlow
python
OpenFOAM®
R
Bioconductor
OPEN SOURCE SOFTWARE FOR BIOINFORMATICS
QUANTUMESPRESSO
PyTorch
WRF
OpenCV
PETSc

(and more software)

EESSI
EUROPEAN ENVIRONMENT FOR SCIENTIFIC SOFTWARE INSTALLATIONS

Automatically "streamed" to EuroHPC systems (and beyond)









The EESSI user experience

Software installations provided by EESSI are available via `/cvmfs/software.eessi.io`

Recommend way of working:

0) Make sure that EESSI is accessible: `ls /cvmfs/software.eessi.io`

1) Update your shell environment by initializing EESSI (incl. auto-detection of CPU & GPU)

For example:

```
module use /cvmfs/software.eessi.io/init/modules
module load EESSI/2025.06
```

2) Load one or more modules to "activate" the software you want to use

For example: `module load GROMACS/2025.2-foss-2025a`

3) Science!

Running software is (typically) **"streamed in" on-demand** via CernVM-FS

Feels like a local software stack, yet same software stack available everywhere!

Current status of EESSI: CPU targets

- EESSI currently supports 15 different CPU targets
- Each CPU target corresponds to a specific CPU microarchitecture (CPU generation)
  - AMD CPUs: Zen 2 (Rome), Zen 3 (Milan), Zen 4 (Genoa), Zen 5 (Turin)
  - Intel CPUs: Haswell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids
  - Arm CPUs: Neoverse N1, Neoverse V1, Fujitsu A64FX, NVIDIA Grace
  - Generic targets for both Intel/AMD (x86_64) and Arm (aarch64) as fallback
- See also https://eessi.io/docs/software_layer/cpu_targets
- Software Listing in MyEFP will map this to EuroHPC supercomputer partitions

Current status of EESSI: GPU support

- EESSI currently includes software installations that target NVIDIA GPUs
- Different generations are supported, based on CUDA Compute Capabilities (CC)
  - In EESSI 2023.06: Volta (CC 7.0, V100), Ampere (CC 8.0, A100), Hopper (CC 9.0, H100/H200)
  - In EESSI 2025.06: Volta, Ampere, Hopper, Blackwell (CC 10.0 + CC 12.0)

- Running CUDA software included in EESSI should work out of the box,

  as long as NVIDIA GPU drivers have been exposed to EESSI

- Building CUDA software on top of EESSI requires a full CUDA SDK installation

  that is “injected” into EESSI

- EESSI working very hard on AMD GPU support

- See also https://eessi.io/docs/gpu

Integration of EESSI into EuroHPC Federation Platform

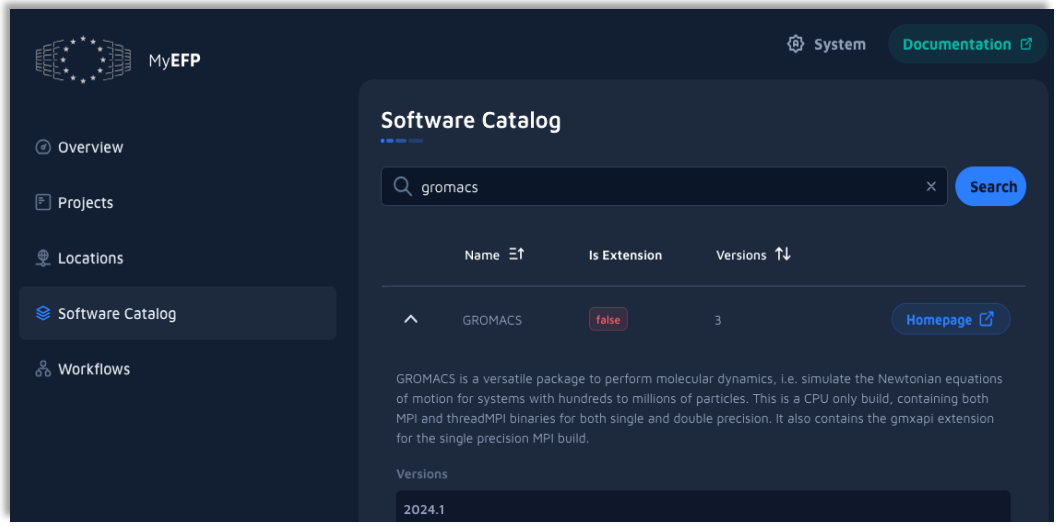
EESSI is the base for the Federated Software Catalog (FSC) component of EFP

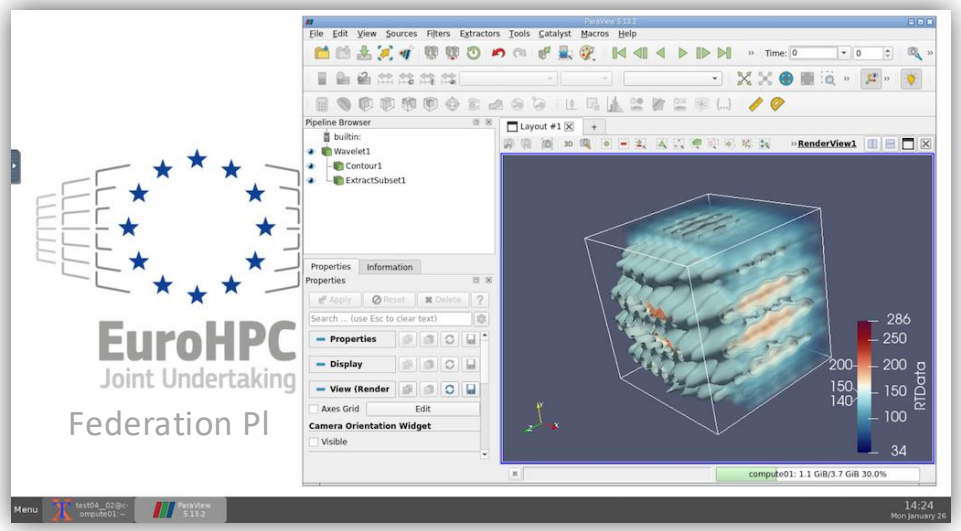
EFP FSC is already available on EuroHPC supercomputers

- EFP consortium is working together closely with EuroHPC Hosting Entities on this
- Deployment of EESSI will differ across systems, but user experience should be the same

Integration of EESSI into EuroHPC Federation Platform

- Software listing in MyEFP will provide EuroHPC-aware overview of available software
- Open OnDemand apps in EFP Interactive component will rely on software provided by FSC





- FSC can be used to run Slurm jobs, or run workflows with EFP Workflows component
- Focus in EFP is on EESSI 2025.06 (and more recent), though EESSI 2023.06 also available

Availability of FSC on EuroHPC systems

- Already available today on:
  - **Vega**, **Deucalion**, **Karolina**, **Discoverer, Leonardo*** (native via CernVM-FS)
  - **MareNostrum 5** (via export in GPFS); **LUMI, MeluXina** (via mount of SquashFS image)

(*) only in jobs that request access to EESSI

- Coming soon on:
  - **JUPITER** (native via CernVM-FS)

- Later also on future EuroHPC supercomputers: Daedalus, Arrhenius, Alice Recoque, ...

  as well as AI Factories + Quantum computers

- How to get access to EESSI will differ slightly on some systems due to site policies,

  but user experience once EESSI is available should be the same across systems

Using the Federated Software Catalog: Live Demo

- Multi-node (CPU-only) GROMACS job, using EESSI 2025.06
- 2 nodes, 6 MPI ranks, 8 threads each (2x48 cores = 96 cores in total)
- Testcase B input file from Unified European Applications Benchmark Suite (UEABS)
- Almost exact same job script on all EuroHPC resources
    - On Lumi:

```
sbatch --partition standard --account project_465002401 --constraint eessi gromacs-UEABS-TestCaseB.sh
```

Using the Federated Software Catalog: Live Demo

```
#!/bin/bash
#SBATCH --cpus-per-task=8
#SBATCH --tasks-per-node=6
#SBATCH --nodes=2
#SBATCH --time=2:0:0

cd $HOME/EFP/FSC-demo/GROMACS

source /cvmfs/software.eessi.io/versions/2025.06/init/lmod/bash
module load GROMACS/2025.2-foss-2025a

export OMP_NUM_THREADS=$SLURM_CPUS_PER_TASK

# input file obtained from https://repository.prace-ri.eu/ueabs/GROMACS/2.2/GROMACS_TestCaseB.tar.xz
mpirun gmx_mpi mdrun -s GROMACS_TestCaseB/lignocellulose.tpr -deffnm GROMACS-
2025.2.TestCaseB.$SLURM_JOBID -cpt 1000 -maxh 2.0 -nsteps 50000 -ntomp $OMP_NUM_THREADS
```

Adding Software to the Federated Software Catalog

- To **add software** to the EFP Federated Software Catalog, it should be **added to EESSI**
  - Software included in EESSI is currently installed via EasyBuild
  - Redistribution of the software (+ dependencies) must be allowed

    ⇒ OK for open source software
  - Installation should work on all supported CPU targets (Intel, AMD, Arm)
  - Software test suites should pass
  - See also EESSI Contribution Policy

- Onboarding of software into EESSI is done by opening a (simple) pull request (see EESSI docs)
  - Pull request to EasyBuild must be opened & merged first if software (version) is not supported yet
- Once software is installed in EESSI, it will automatically become available on EuroHPC systems
- EFP Helpdesk can help you with onboarding of software into EESSI: helpdesk@my-eurohpc.eu

What about performance?

- EESSI included optimized software installations for specific CPU & GPU generations
- CPU & GPU of system on which EESSI is used is auto-detected
- Overall, performance should be good
  - Fine-tuning may be possible for some software, for example via environment variables
- Host injections mechanism supported by EESSI can be used to “plug in” customized libraries, like a vendor-provided MPI library
  - Must be ABI compatible with what is used in EESSI

Getting help for the Federated Software Catalog

- If you have questions related to EFP Federated Software Catalog, contact EFP Helpdesk

  helpdesk@my-eurohpc.eu

- We can provide help with:
  - Answering (high-level) questions related to software available in FSC
  - Software installations included in FSC not working as expected on a EuroHPC system
  - Resolving the problems you have with onboarding of software into EESSI

Upcoming webinars – more info at https://my-eurohpc.eu/training

Webinar 1 of 5 — **Introduction to the EuroHPC Federation Platform**
Recording available!

Webinar 2 of 5 — **EFP Federated Software Catalog**
Recording available!

Webinar 3 of 5 — **EFP Interactive**
Recording available!

Webinar 4 of 5 — **EFP Authentication & Authorization Infrastructure (AAI)**
Date: Wed 29 April 2026 14:00-15:00 CET
Speaker: Josh Howlett (GÉANT)

Webinar 5 of 5 — **EFP Workflows**
Date: May 2026 *(to be scheduled)*
Speaker: Martin Golasowski (IT4I)

Scan me for more information on upcoming EFP webinars!

In case of questions, contact EFP consortium via: helpdesk@my-eurohpc.eu

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VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER
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