



EPICURE

# EPICURE Application Support for EuroHPC Users

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Co-funded by  
the European Union

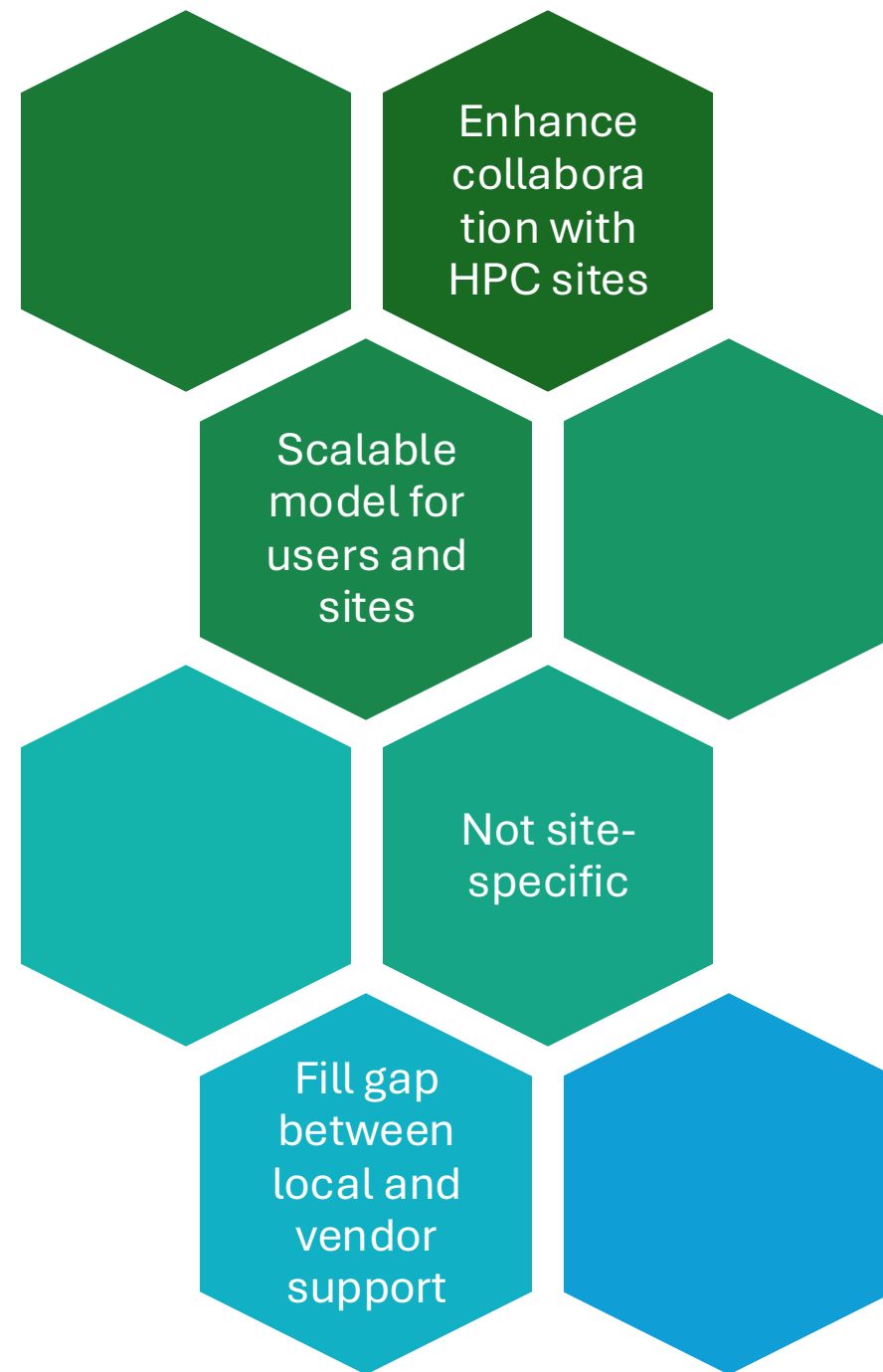


**EuroHPC**  
Joint Undertaking

This project has received funding from the European High Performance Computing Joint Undertaking under grant agreement No. 101139786. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or EuroHPC Joint Undertaking. Neither the European Union nor the granting authority can be held responsible for them.



# What is EPICURE?



Four-year project for providing support services to EuroHPC users (started Feb 2024)

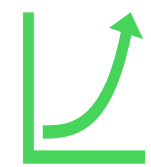
Coordinated by CSC with 17 partners from European HPC sites

Provides a distributed network of **Application Support Teams** (AST) for Level 2 and Level 3 support:

- Porting and Optimization
- Advanced Training
- Development of Best Practice Guides
- Collaboration with equivalent groups at European and global level for pre/exascale applications

# Supported Projects

Any project supported by EuroHPC resources:



Extreme Scale Access



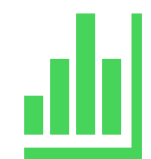
Regular Access



AI



Development



Benchmarking

**WORKAROUND:** Request EuroHPC project with application support (e.g. development)



**Projects not supported**  
e.g. National projects with resources not coming from EuroHPC

# Level 2 Support

Code Porting and  
Enabling

- Enable codes to be installed on EuroHPC systems
- Facilitate deployment on multiple systems
- Customized support

Performance  
improvements (2<sup>nd</sup>  
level), benchmarking  
and performance  
analysis

- Improve performance and scalability of the codes
- Elaboration of performance analysis and benchmarking
- Benchmarking (e.g. using automated tools)



# Level 3 Support

**Very High-level support for optimizing** EuroHPC applications:

- Fix issues to allow **full optimization** of applications on EuroHPC systems.
- Optimization **at all levels** for best time or energy to solution
- Solve issues where there are **no documented solutions**
- Advanced customized support requiring specific **scientific domain expertise**.
- **Source code** changes, if necessary, not just build procedure.

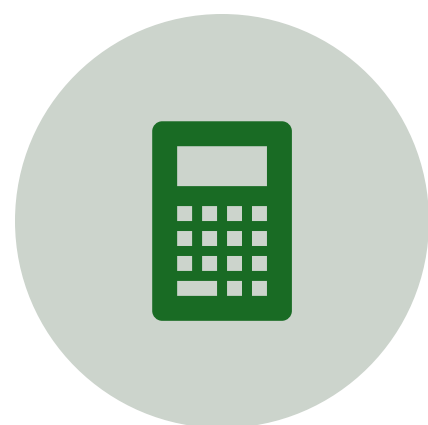


```
def convert_to_cells(line):
    new_cell = Air()
elif line[j] == " ":
    new_cell = Wall()
elif line[j] == "X":
    new_cell = Start()
    check_start += 1
elif line[j] == "Y":
    new_cell = End()
    check_end += 1
elif line[j] == "F":
    new_cell = Fire()
elif line[j] == "W":
    new_cell = Water()
elif not line[j].isdigit() or line[j] == "0":
    raise ValueError("Bad letter in configuration file: {}".format(line[j]))
elif line[j].isdigit():
    new_cell = Teleport(str(line[j]))
    (i-1) += 1
```

# What support does EPICURE not provide

EPICURE does not provide **Level 1 Support** which is best provided by the local computer centre or EuroHPC support.

For example, EPICURE does not provide support for:



Accounting and budgets



Connecting to the system (logins, passwords, etc)



Filesystem usage (e.g. quotas, backup policies)



Basic system usage (e.g. standard job scripts )



# How to apply

Via the submission portal, at the time of submission of the project

Your connection to the code

## Application Support Team (AST)

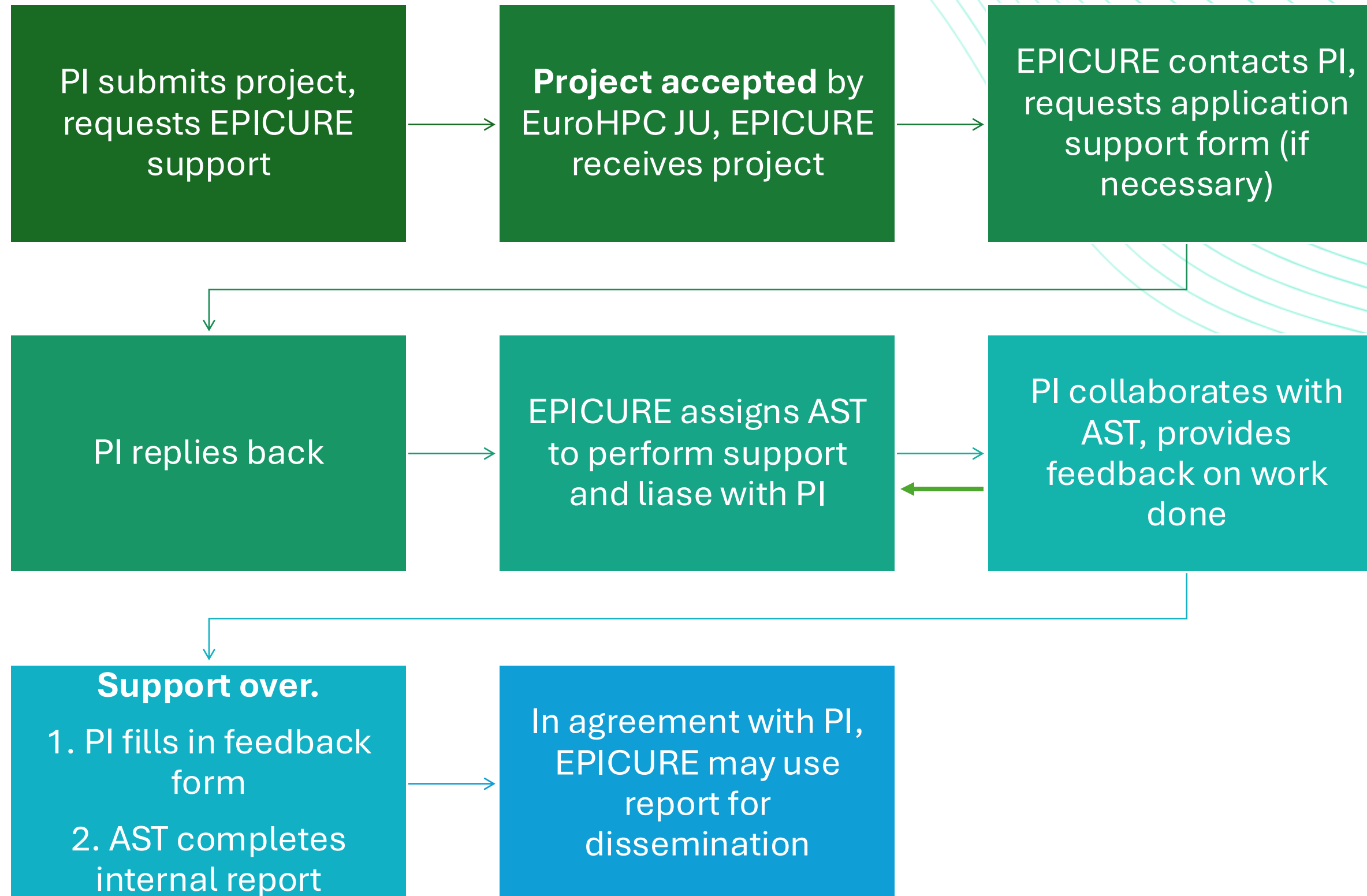
Under the EuroHPC JU EPICURE project, the proposals awarded via the Access calls are able to have to have additional support for

Does your proposal require assistance from an AST on the selected partition(s)?\*

Yes  No

Back

# Support Process



PI realises he/she does not require AST



# How EPICURE allocates support

Site	Expert name	Workpackages	Programming languages	Programming models	Expertise strong
CSC		WP2,WP3,WP4,WP5	C++, CUDA/HIP. Can also work with C, Fortran and Python but not really an expert with those languages	MPI, Multi-threaded, GPU	GPU programming
DeIC		WP2, WP3, WP4	Python	NumPy, CuPy, Dask	The Scientific Python ecosystem, e.g. NumPy, SciPy, Pandas, Dask, CuPy, Xarray, PyTorch, Scikit-Learn, Numba, Matplotlib, Seaborn, mpi4py.
IT4I@VSB		WP2, WP3	C,C++, Python	MPI, OpenMP, CUDA	WP2: code deployment, compilation, benchmarking, ...
INESCTEC		WP3,WP4,WP5	C, C++, CUDA, FORTRAN, Python	MPI, Multithread, GPU	Parallel Programming, benchmarking, Scientific Visualization
INESCTEC		WP3, WP4, WP5	C, C++, Fortran, CUDA	MPI, Multithread, GPU	Parallel Programming, benchmarking, Scientific Computing, Heterogeneous Computing

Expertise Catalog

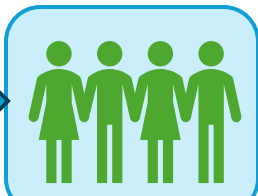
Project ID	EuroHPC Project Type	EuroHPC System	Code	PI	EPICURE experts	Start	End
<a href="#">EHPC-DEV-2024G09-051</a>	Devel	CINECA	GBCD-2	user1	<a href="mailto:m.rossi@cineca.it">m.rossi@cineca.it</a> , <a href="mailto:b@vsb.cz">b@vsb.cz</a>	14/06/2024	
EHPC-AI-2024G09-0519	AI	BSC	DeepMind	user2	<a href="mailto:c@bsc.es">c@bsc.es</a> , <a href="mailto:e.izum.si">e.izum.si</a>	09/07/2024	
EHPC-REG-2024G09-0519	Regular	LuxProvide	GROMACS	user3	<a href="mailto:ilya@kth.se">ilya@kth.se</a>	05/08/2024	10/10/2024

Projects Accounting Table

Internal project report



Continuous update



AST

allocates

periodic reports

**EPICURE SUPPORT COORDINATION**

Find experts based on project  
Update project details

Received by EPICURE  
Receive project data

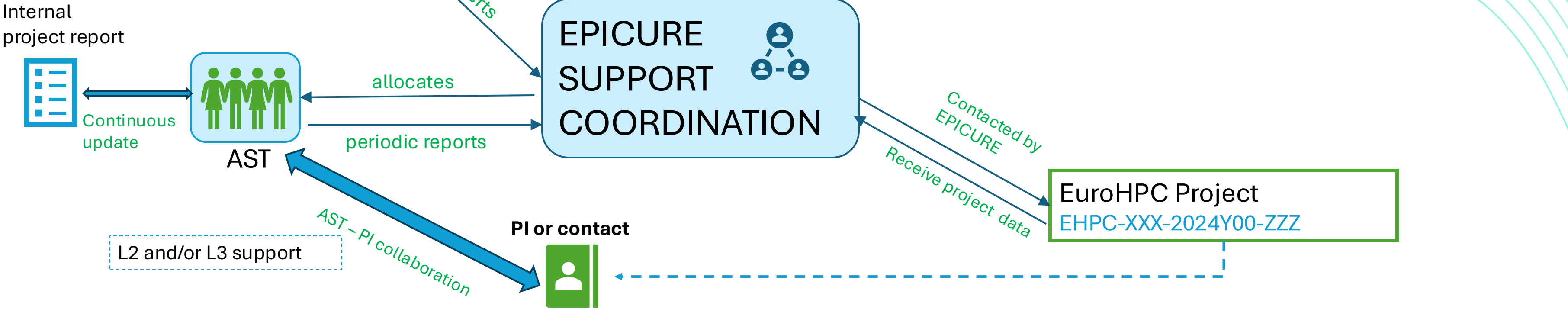
**EuroHPC Project**  
[EHPC-XXX-2024Y00-ZZZ](#)

PI or contact



L2 and/or L3 support

AST - PI collaboration



# Interactions with users

- Dialogue with EuroHPC users is essential for a good support outcome.
- For this reason, EPICURE starts support with a face-to-face call and project PI + AST should regularly update
- Final obligation for project members is to provide feedback on the support achieved.
- In collaboration with PI, publish successful outcomes.



*“ Thanks to EPICURE support of our EuroHPC project XXX, we have been able scale to our AI model over hundreds of GPU nodes ”,*

At the end of the project, a link to the user feedback form is sent to the project's primary contact. If the form hasn't been filled, a reminder is sent after two working weeks. The survey responses will be linked to the project information.

The form will ask the following questions:

**How helpful was it for your team to participate in EPICURE? 1 (not at all) - 5 (very helpful)**

**Have your objectives been reached? (Yes/Partially/No/Not applicable)**

1. Code porting and enabling to the selected machine.
2. Performance improvements, benchmarking, and performance analysis.
3. Code optimization – intra-node optimization.
4. Code optimization – inter-node optimization and scaling-out.
5. Code optimization – GPU accelerator porting and optimization.

Free text to explain

**Would you recommend other research groups to apply for EPICURE support? 1 (not at all) - 5 (strongly)**

**Regarding the support and processes from EPICURE:**

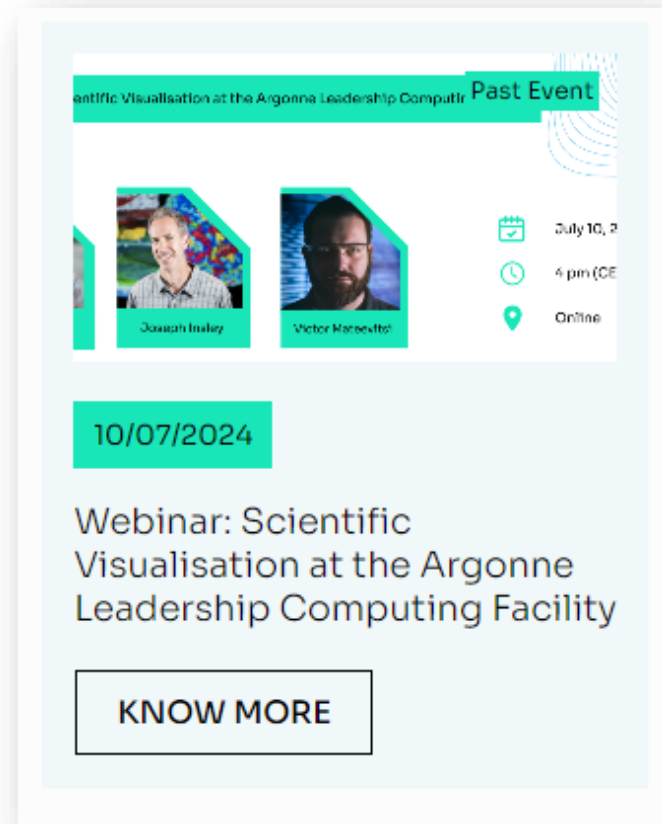
1. What worked?  
Free text to explain
2. What didn't work? How could it be improved?  
Free text to explain
3. How much working time do you think you and your team members saved?  
Free text to explain
4. How satisfied were you with the availability of and communication with the support staff? 1 (not at all) - 5 (very satisfied)
5. Did you learn or achieve something more than you originally requested support for?  
Free text to explain

Project Feedback Form



# Training Events

Scientific Visualisation at the Argonne Leadership Computing Facility **Past Event**



10/07/2024

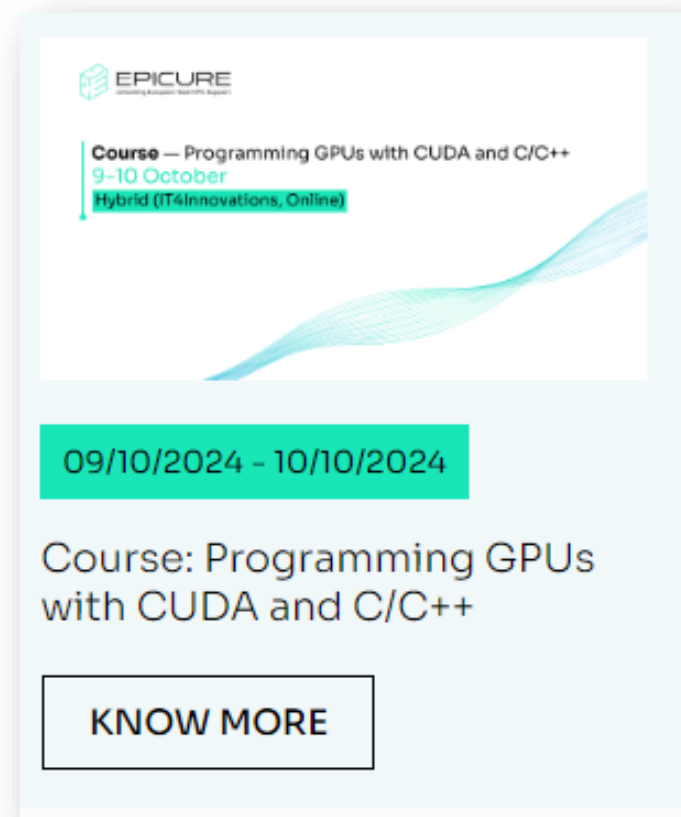
Webinar: Scientific Visualisation at the Argonne Leadership Computing Facility

[KNOW MORE](#)

## Webinars

EPICURE

Course — Programming GPUs with CUDA and C/C++  
9-10 October  
Hybrid (IT4Innovations, Online)



09/10/2024 - 10/10/2024

Course: Programming GPUs with CUDA and C/C++

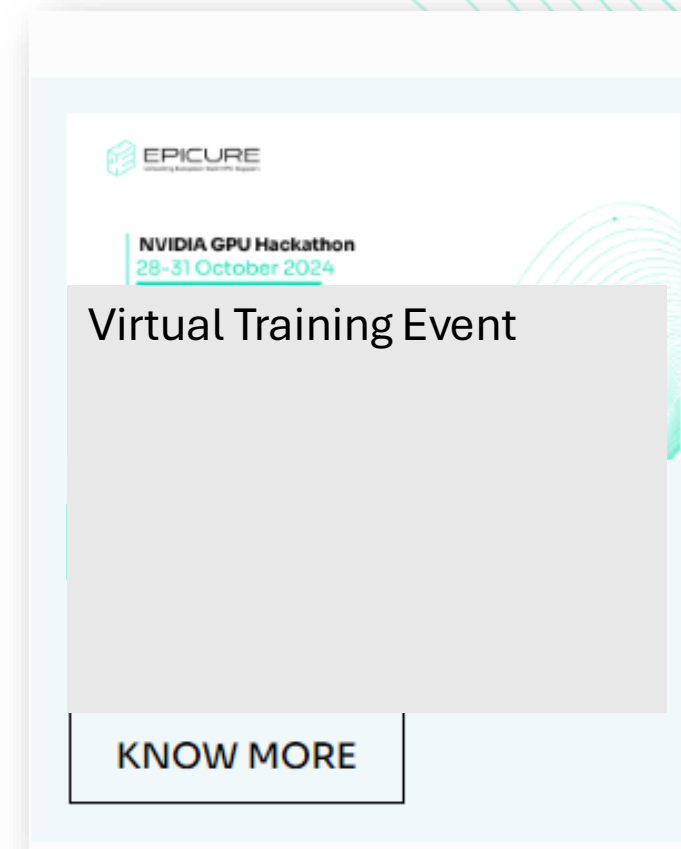
[KNOW MORE](#)

## Online courses

EPICURE

NVIDIA GPU Hackathon  
28-31 October 2024

Virtual Training Event

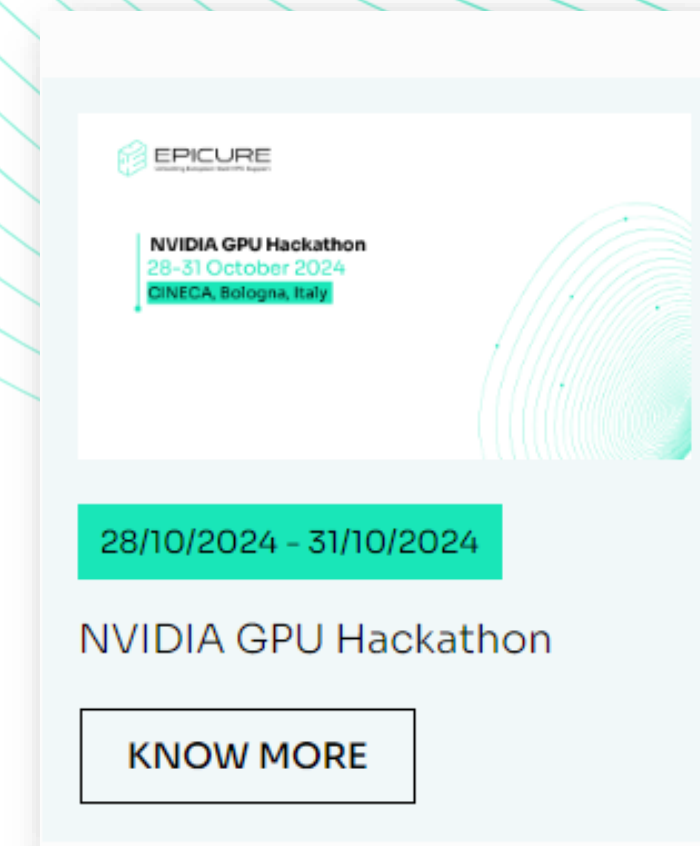


[KNOW MORE](#)

## Workshops and Training Events

EPICURE

NVIDIA GPU Hackathon  
28-31 October 2024  
CINECA, Bologna, Italy



28/10/2024 - 31/10/2024

NVIDIA GPU Hackathon

[KNOW MORE](#)

## Hackathons

### Next Hackathon

CINECA 28/10/2024 - 31/10/2024





**EPICURE**  
Unlocking European-level HPC Support

# Thank you!



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