



POP CoE Services

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HORIZON-EUROHPC-JU-2023-COE



EuroHPC
Joint Undertaking

1 January 2024– 31 December 2026

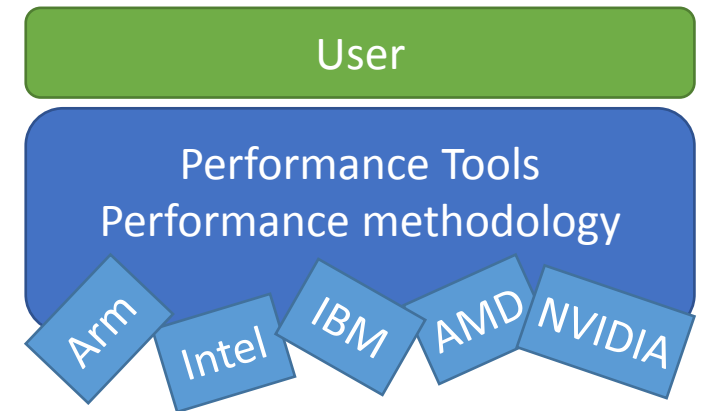
Grant Agreement No 101143931



Context and history



- **POP-CoE** starts in 2015
- Objectives:
 - To offer performance analysis services to European HPC users.
 - To develop a common methodology for performance analysis
- **POP1** runs from October 2015 to March 2018
- **POP2** runs from December 2018 to June 2022
- **POP3** will run between January 2023 and December 2026



Partners



• Who?

- BSC (coordinator), ES
- HLRS, DE
- JSC, DE
- INES-ID, PT
- RWTH Aachen, IT Center, DE
- TERATEC, FR
- IT4I, CZ
- UVSQ, FR

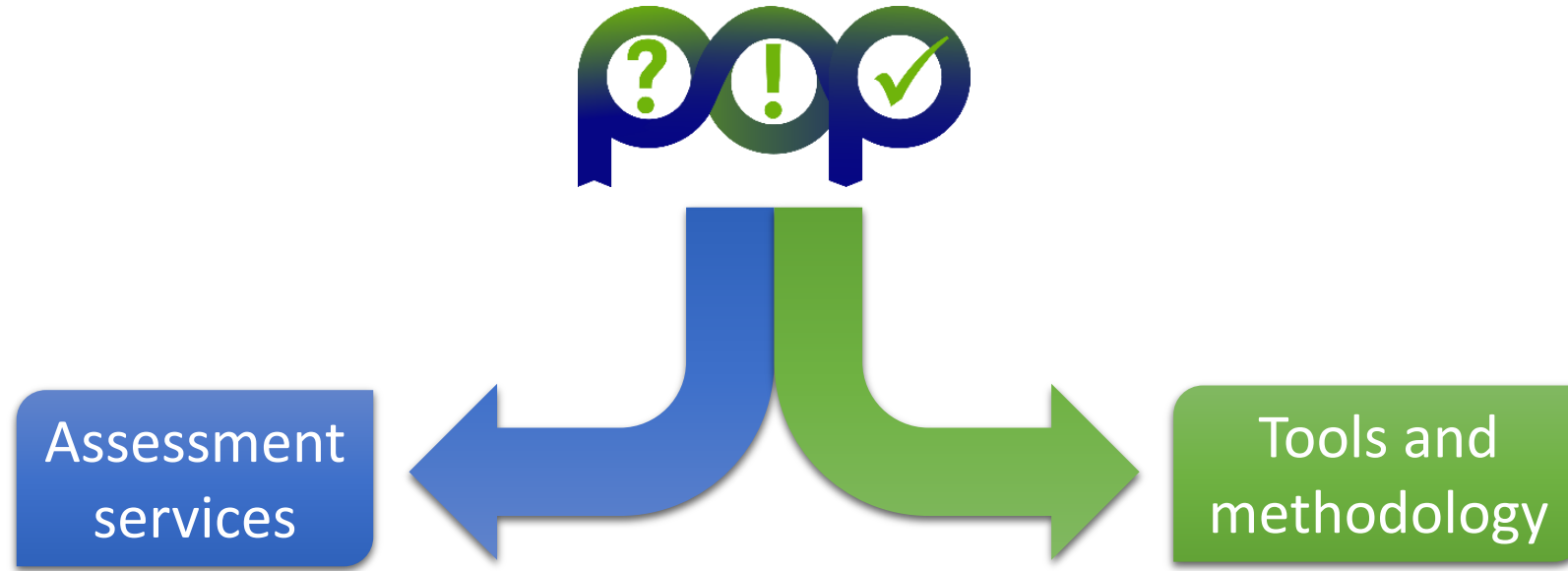


A team with

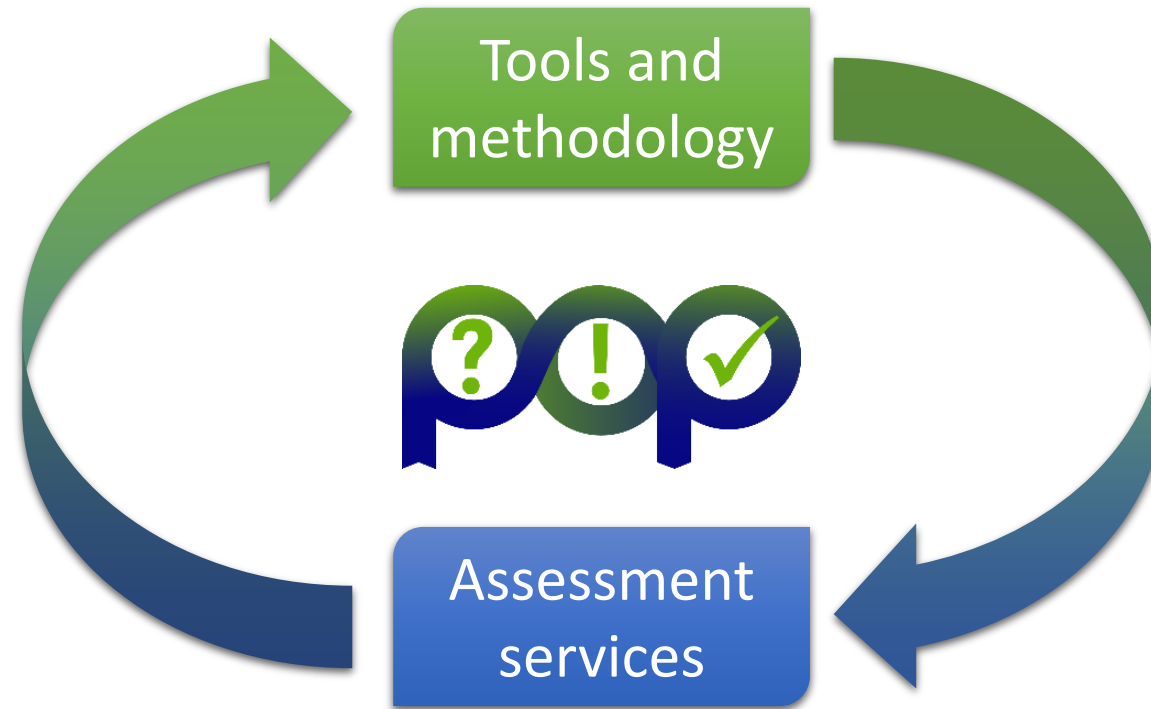
- Excellence in performance tools and tuning
- Excellence in programming models and practices
- Research and development background AND proven commitment in application to real academic and industrial use cases



Objectives



Objectives



Services provided by the CoE



? Parallel Application Performance Audit

⇒ Report

➤ Primary service

- Identify performance issues of customer code (at customer site)

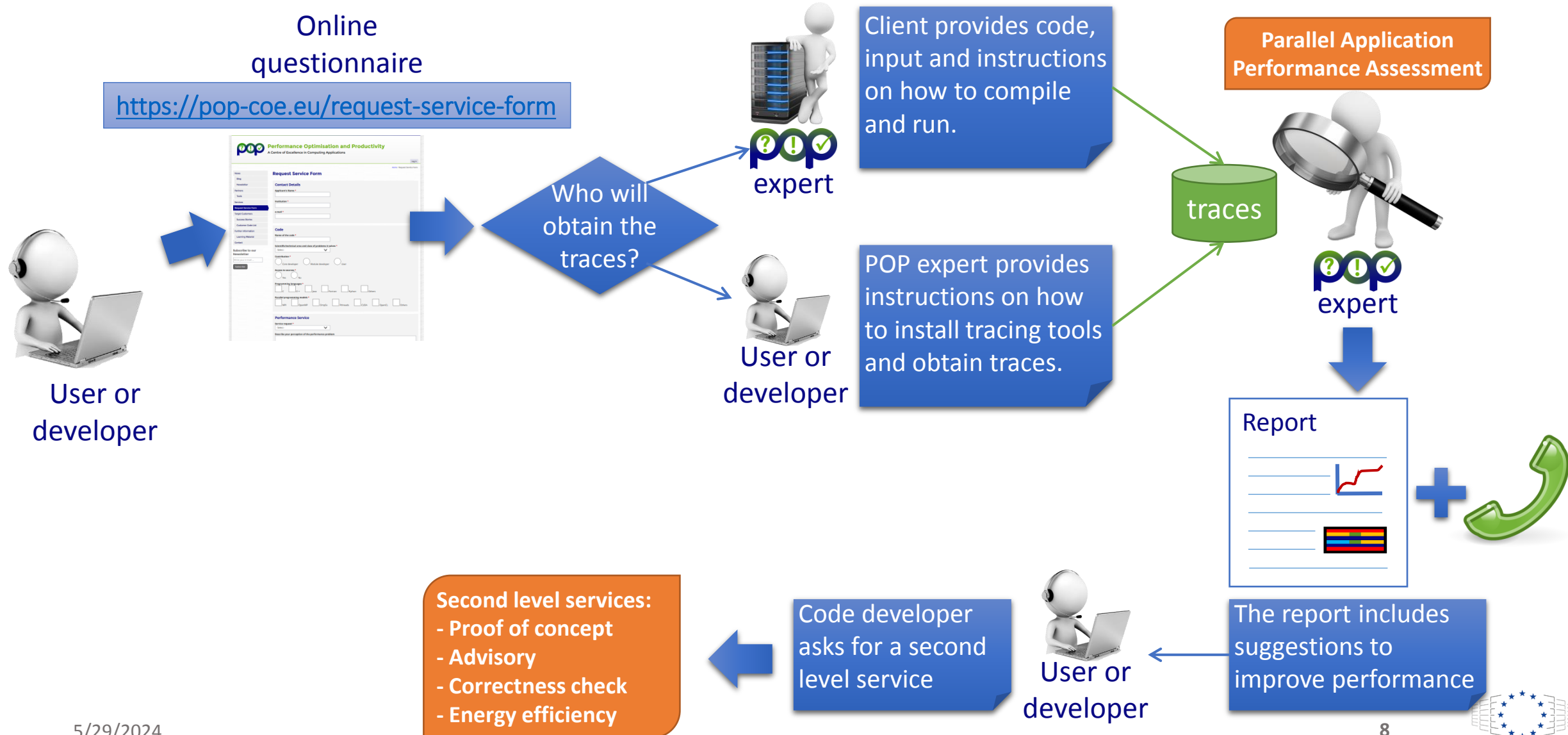
! ✓ Second level Services

⇒ Report

➤ More specific depending on the demand of the customer

- Proof-of-concept (⇒ **Software demonstrator**)
- Energy efficiency audits
- Correctness checks
- Advisory study

POP3 services



From POP and POP2 to POP3



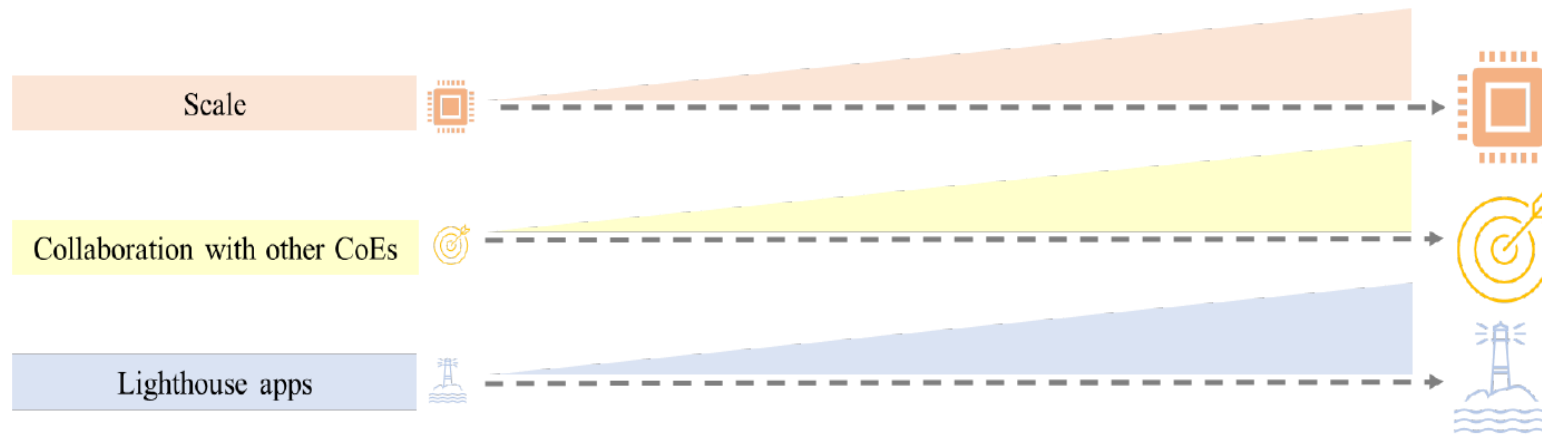
POP and POP2

Average number of cores per study 4K

More than 400 studies

30% studies use less than 100 cores

Satisfaction rate always above 90%



From POP and POP2 to POP3



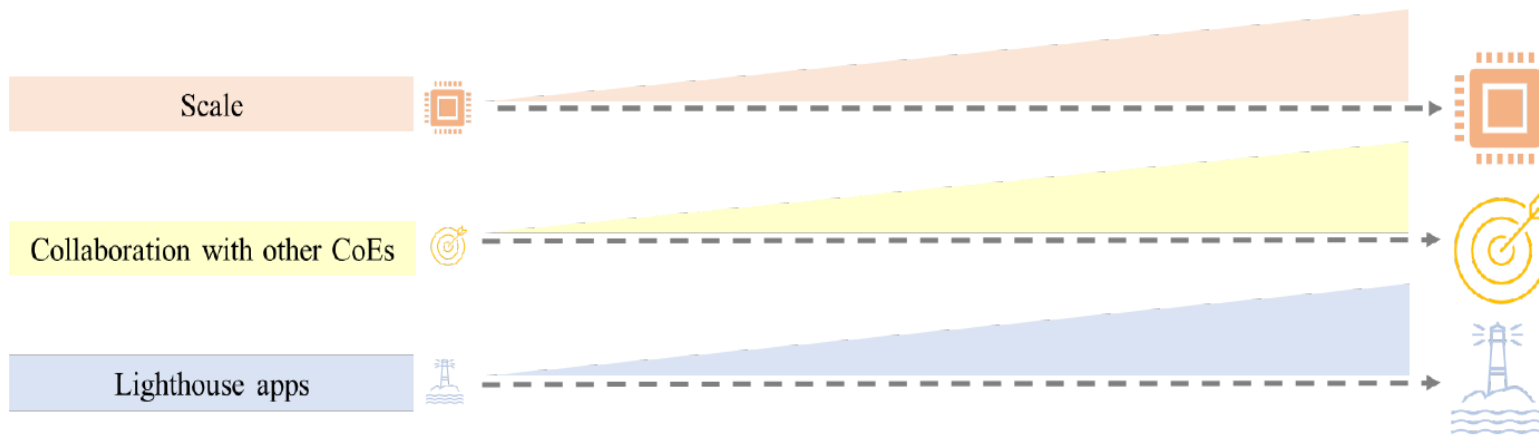
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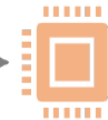


POP and POP2

POP3

Average number of cores per study 4K

Scale



120 studies

More than 400 studies

Collaboration with other CoEs



82 studies for CoEs

30% studies use less than 100 cores

Lighthouse apps



Assess exascale readiness

Satisfaction rate always above 90%

Collaboration with other CoEs



POP and POP2

- Campaigns
 - Cheese x2
 - Nomad2
 - CoEC
- Individual assessments
 - Excellerat
 - Esiwace
 - CompbioMed
 - ...

POP3

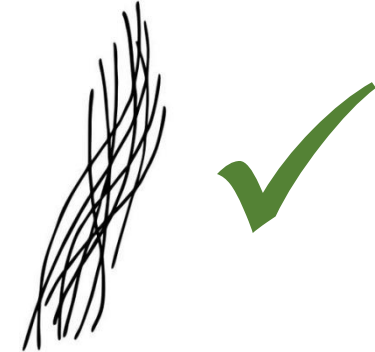
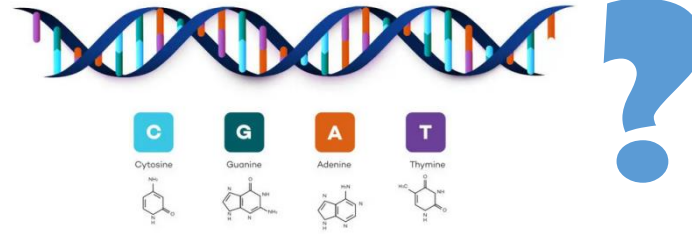
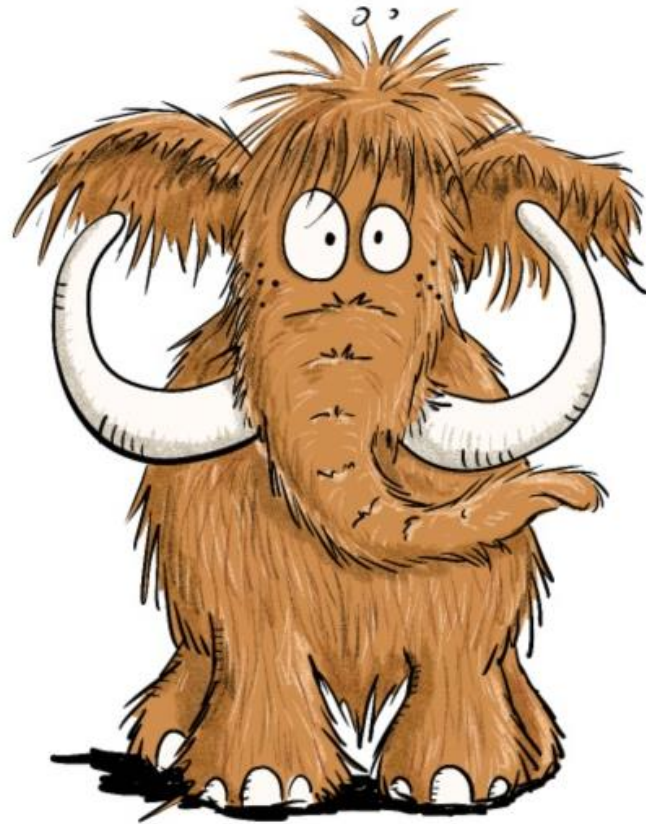
- Ongoing campaigns
 - Cheese2
 - SPACE
 - MultiXscale
- Planed
 - Before end 2024: CEEC
 - After: All

Are our tools ready for exascale?



Are YOUR codes ready?

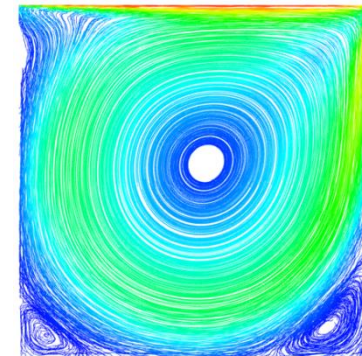
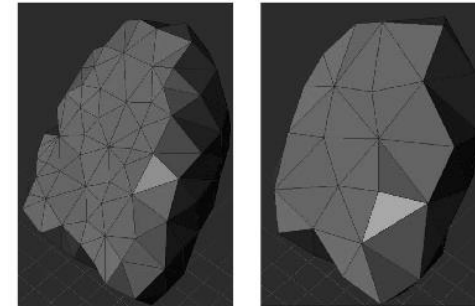
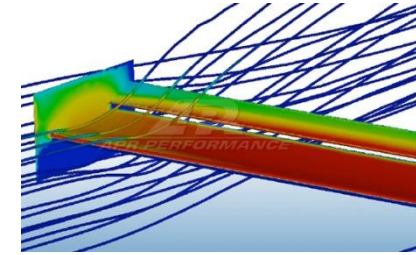
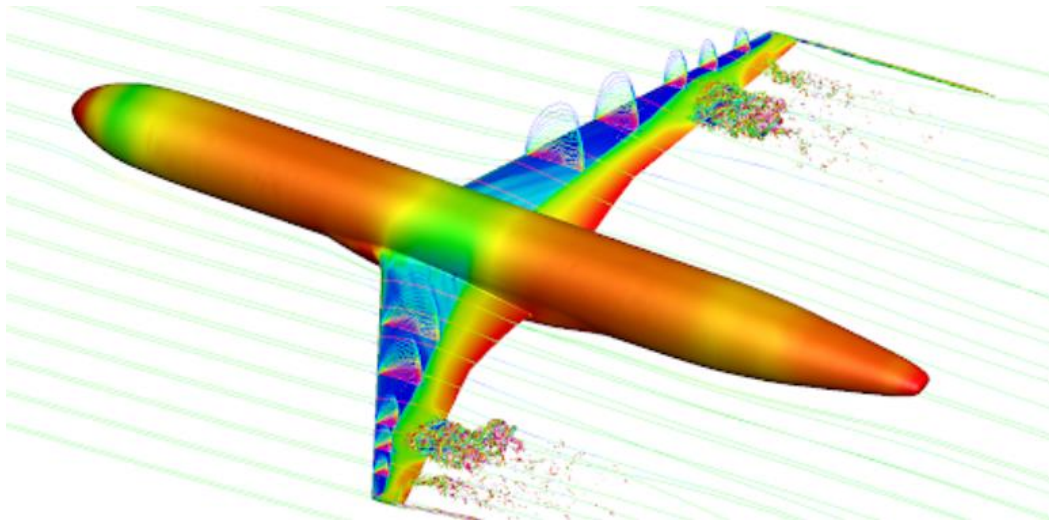
Is scale what matters?



Is scale what matters?



PERFORMANCE?



What can you tell me about my code?

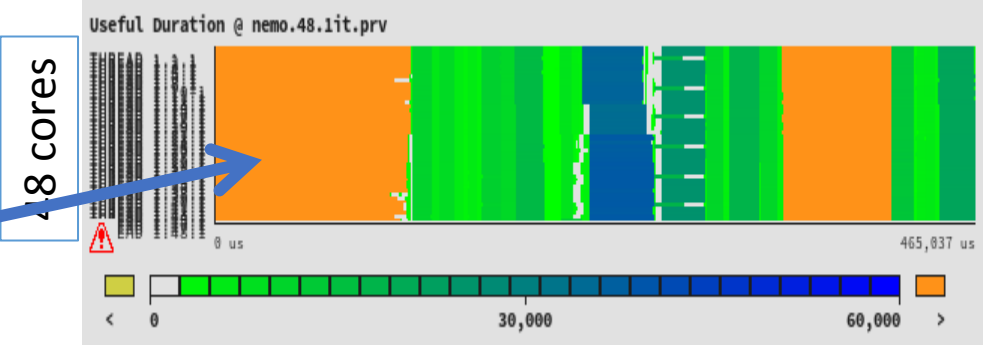


Or why profiling is not enough...

Why profiling is not enough



A profiler will tell you to optimize here →

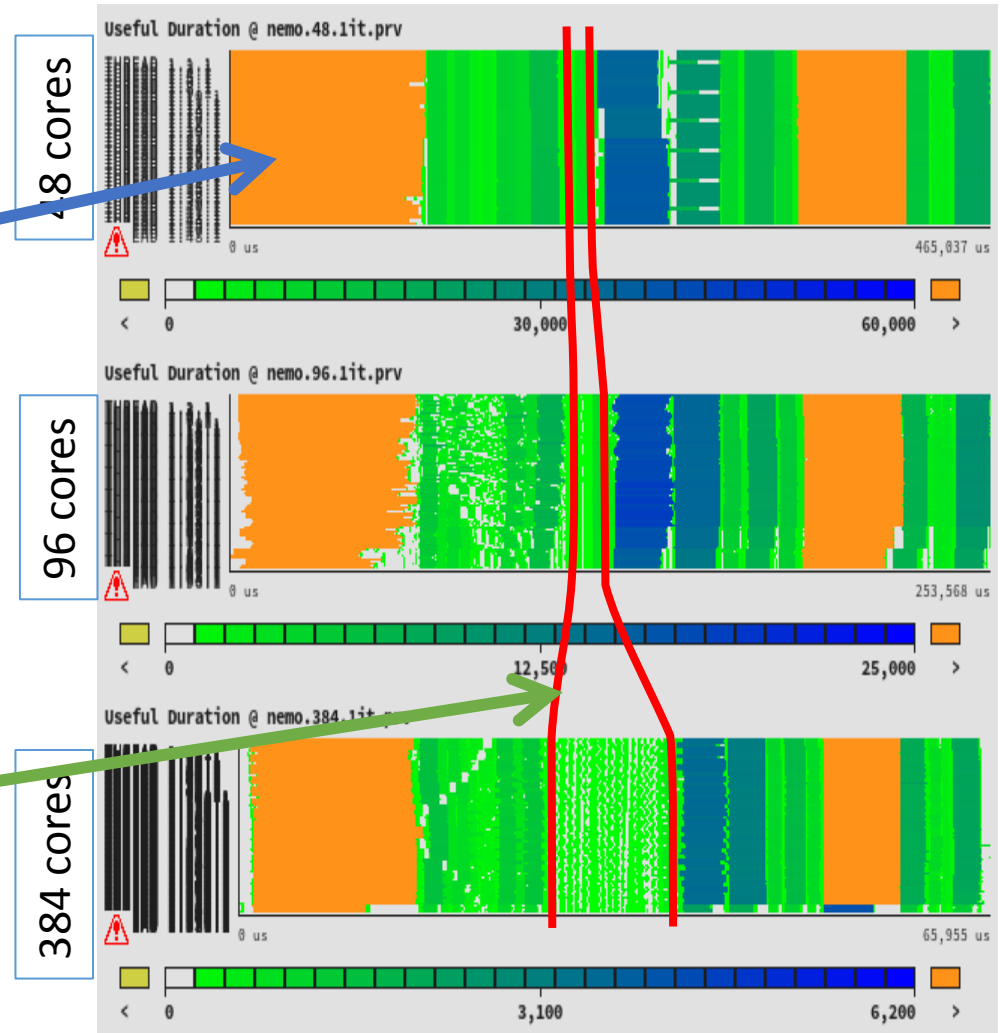


Why profiling is not enough

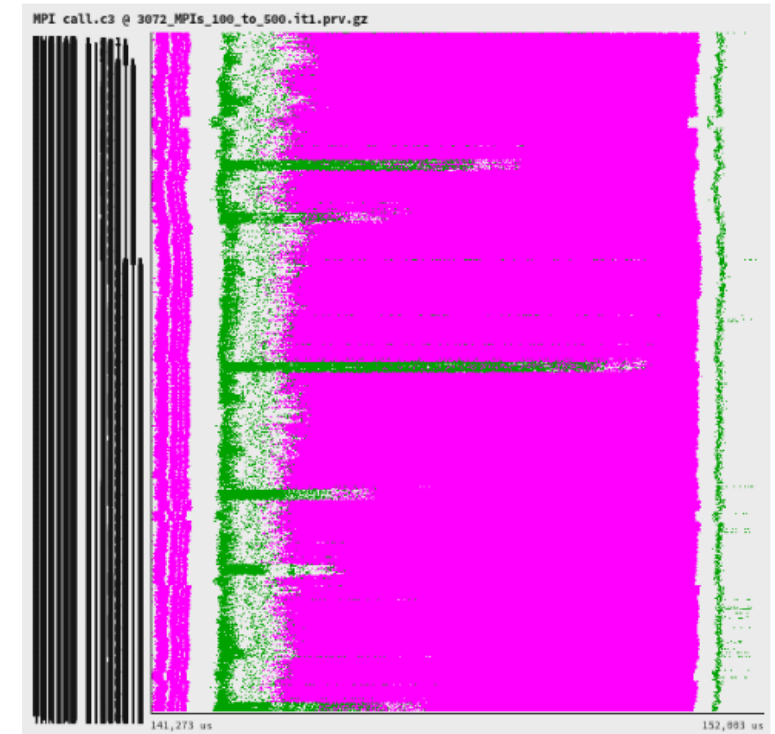
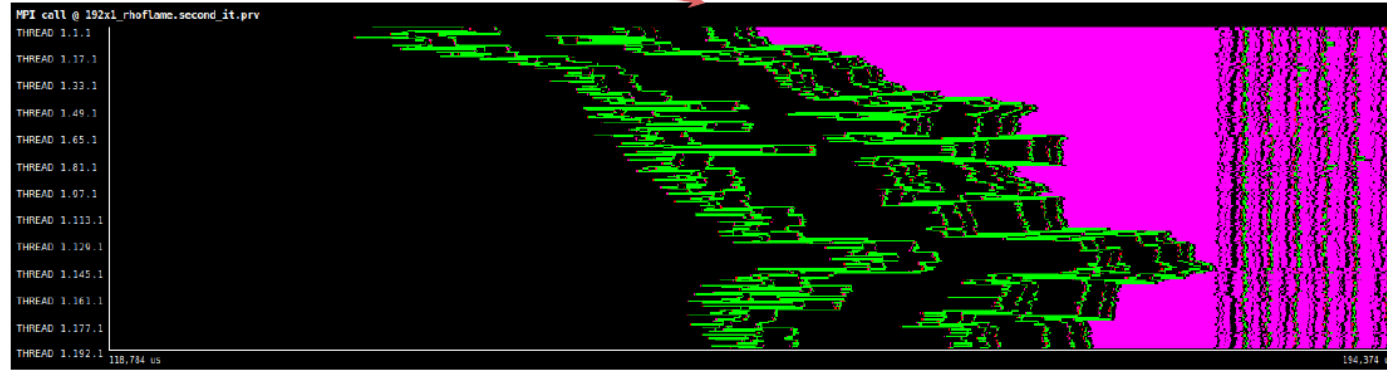


A profiler will tell you to optimize here →

The performance analyst will tell to look at this



Why profiling is not enough



What can you tell me about my code?



Or why profiling is
not enough...

From efficiencies...

...to detail

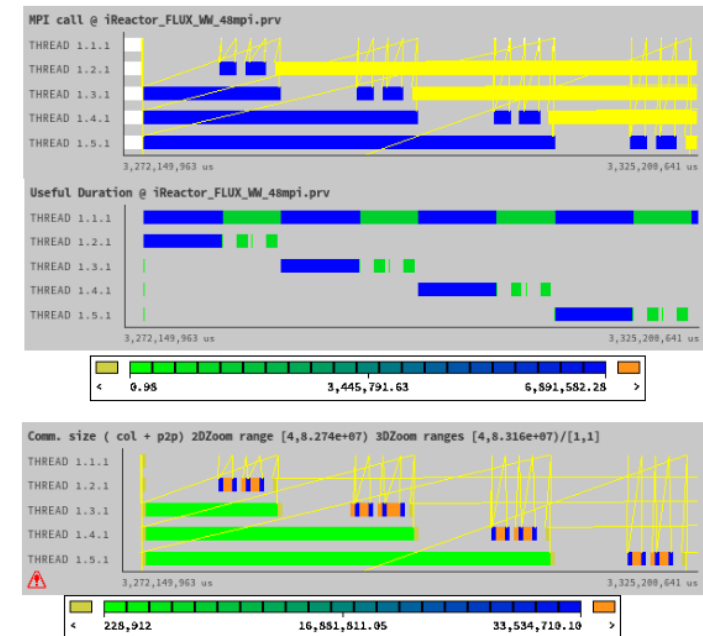
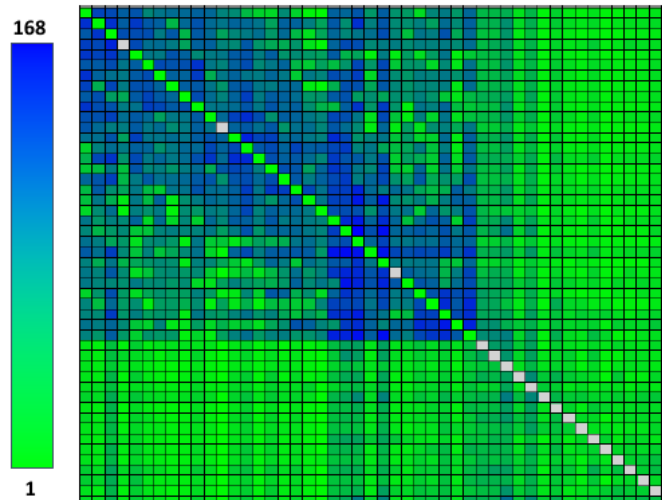
From efficiencies to detail



Look at the correct place

Number of processes	1	2	4	8	12	24	48
↳ Parallel efficiency	100.00	96.18	94.77	94.27	88.65	80.59	73.19
↳ Load balance	100.00	96.27	95.42	95.28	91.98	90.56	90.03
↳ Communication efficiency	100.00	99.91	99.32	98.94	96.39	88.99	81.29
↳ Computation scalability	100.00	97.38	95.49	93.58	89.61	85.26	83.88
↳ IPC scalability	100.00	99.29	98.60	97.73	96.48	95.23	93.19
↳ Instruction scalability	100.00	97.76	96.40	95.39	92.52	91.51	90.57

... and obtain insight



To summarize...



- We provide services to European HPC users
 - But we focus on CoEs
 - Through campaigns
 - Or individual assessments
- We have tools to
 - Analyze at large scales
 - Provide efficiency metrics
 - Give detailed insight



Performance Optimisation and Productivity 3

A Centre of Excellence in HPC

Contact:

 <https://www.pop-coe.eu>

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 [@POP_HPC](#)

 [youtube.com/POPHPC](https://www.youtube.com/POPHPC)

