POP3: Performance Optimisation and Productivity Center of Excellence

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HORIZON-EUROHPC-JU-2023-COE

EuroHPC Joint Undertaking

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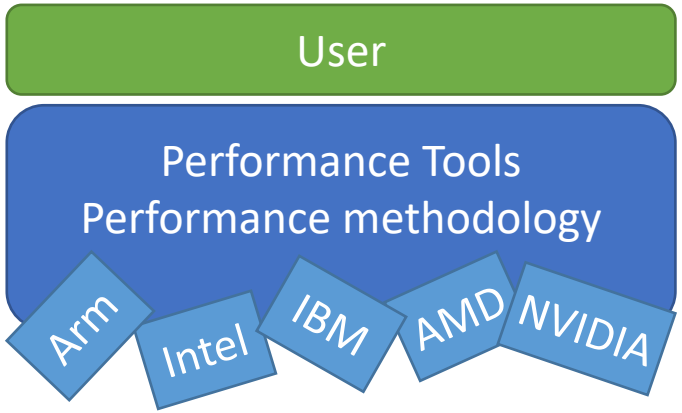
POP CoE

- A **Centre of Excellence**
  - On **Performance Optimisation and Productivity**
  - Promoting **best practices in parallel programming**
- Providing **FREE Services**
  - Precise understanding of application and system behaviour
  - Suggestion/support on how to refactor code in the most productive way
- **Horizontal**
  - Transversal across application areas, platforms, scales
- **For (EuroHPC) academic AND industrial codes and users !**

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

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Why it works?

- Diversity of expertise to cover all areas
  - Some of them tool developers, some of them analysts, some customer advocate
- Diversity of tools for resiliency
- Diversity of backgrounds to design a common methodology

Objectives

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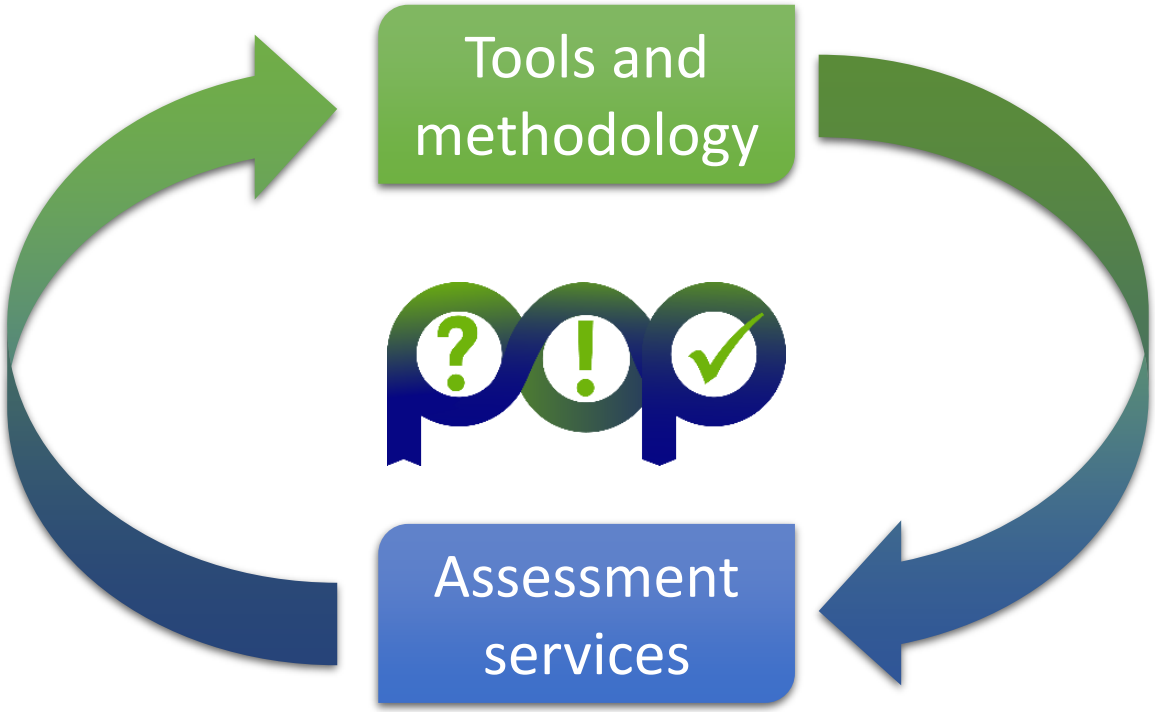


FREE Services provided by the CoE

- **Parallel Application Performance Assessment**
  - Primary service
  - Initial analysis measuring a range of performance metrics to assess quality of performance and identify the issues affecting performance (at customer site)
  - If needed, undertakes further performance evaluations to identify the root causes of the issues found and qualify and quantify approaches to address them (recommendations)
- **Second Level Services**
  - Second level services may follow after conclusion of an initial performance assessment:
    - **Proof-of-concept**: explore the potential benefit of proposed optimisations by applying them to selected regions of the applications
    - **Correctness-check**: evaluate the correctness of hybrid MPI + OpenMP applications
    - **Energy-efficiency study**: investigate improvements of energy consumption or efficiency
    - **Advisory study**: ongoing consultancy for customers that choose to implement proposed optimisations on their own
- Note: Effort shared between our experts and customer!

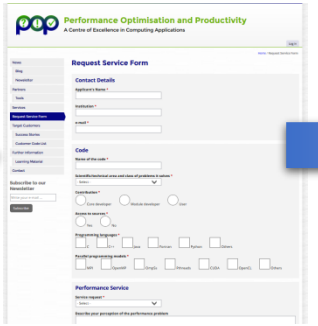
Target Customers

- **Code developers**
  - Assessment of detailed actual behaviour
  - Suggestion of most productive directions to refactor code
- **Users**
  - Assessment of achieved performance in specific production conditions
  - Possible improvements modifying environment setup
  - Evidence to interact with code provider
- **Infrastructure operators**
  - Assessment of achieved performance in production conditions
  - Possible improvements from modifying environment setup
  - Information for time computer time allocation processes
  - Training of support staff
- **Vendors**
  - Benchmarking
  - Customer support
  - System dimensioning/design

POP3 services

Online questionnaire

https://pop-coe.eu/request-service-form



User or developer

Who will obtain the traces?

expert

Client provides code, input and instructions on how to compile and run.

User or developer

POP expert provides instructions on how to install tracing tools and obtain traces.

traces

Parallel Application Performance Assessment

expert

Report

The report includes suggestions to improve performance

User or developer

Code developer asks for a second level service

Second level services:
- **Proof of concept**
- **Advisory**
- **Correctness check**
- **Energy efficiency**

EuroHPC Joint Undertaking

Performance Optimisation and Productivity 3

A Centre of Excellence in HPC

Contact:

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