



ChEESE

Work Package 2:
Status and next steps
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WP2: Tasks

WP2 tasks					
Task	Name	Lead partner	Start month	End month	Percentage at M12 (%)
2.1	Code audits	HLRS	3(27)	15(36)	45%
2.2	Increasing the performance portability of flagship codes for different accelerators	CIN	1	48	10%
2.3	Optimisation for Exascale	CIN	6	48	15%
2.4	Continuous Performance Efficiency Monitoring	BSC	18	48	0%

WP2: Deliverables

D	Deliverable name	Short description	Lead	Type	Level	M
2.1	First code audit report	First code audit round results and the recommendations arising from the analysis	HLRS	R	PU	12
2.2	First report on improving code performance at exascale	Report on porting, optimization and tuning for the selected applications on the available hardware	CIN	R	PU	24
2.3	Second code audit report	Update of D2.1 and further recommendations arising from the analysis	HLRS	R	PU	30
2.4	Final report on improving code performance at exascale and Best Practice Guide	Technical report describing the achieved scalability level and related performances obtained for the selected applications on the available hardware including a final Best Practice guide	CIN	R	PU	48

WP2 methodology

M12

M24

Task 2.4

Continuous Performance Efficiency Monitoring

*First
code-audit
report*

*First report
on improving
code
performance
at exascale*

*Second
code-audit
report*

*Final report
on improving
code
performance
at exascale
and Best
Practice
Guide*

D2.1



Task 2.1

D2.2



Task 2.2

Task 2.3

D2.3



Task 2.1

D2.4



Task 2.2

Task 2.3



“Recommendations” for WP2

R1

The focus in the activities oriented to achieve pre-exascale should be a priority in the project.

R2

*It is recommended for future monitoring periods to improve the reporting of the activities performed in the year of evaluation. **For instance in D2.1 it is recommended to include a table with a summary of the starting point of each code at the beginning of the monitoring period and the advance achieved at the end of that monitoring period.***

R3

*Another recommendation regarding reporting is that all tasks with activities during the monitoring period should be informed, not only those that have associated deliverables. **For instance, it is recommended to include information and evidences regarding tasks 2.2 and 2.3 in the periodic report.** In addition, WP6 has been omitted although it should have started in month 13 of the project. It is recommended to report on its activities even if in an early or preparatory phase.*



“Recommendations” for WP2

R6

Related to [R1] it is recommended to establish a close collaboration with POP3 as soon as possible to ensure that tasks related to performance optimisation of codes can start and will not be further delayed. The status reported in the review meeting suggests that progress suffered from severe delays because POP3 has been established one year later (January 2024) than this CoE. Considering that POP3 may need to adapt its tools to the requirements of this CoE, alternative approaches for measuring code performance need to be considered in the meantime.

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“Answer to the recommendations” from WP2

R1

One of the main goal of ChEESE-2P project is to guarantee efficient (pre-)exascale execution.

In the CHEESE-2P terminology, **capability** or **capacity** runs.

From the WP2 perspective:

- **Capability execution:** refer to an execution able to demonstrate excellent strong scaling up to a relevant fraction of a (pre-)exascale machine.
- **Capacity execution:** refer to an execution able to demonstrate limited strong scaling but excellent weak scaling (approximately in the #of ensambles) spread on a relevant fraction of a (pre-)exascale machine.

According to above, tasks T2.1 and T2.3 are needed to monitor the (pre)exascale current performances (in the two different flavours) of each code and helping in finding and solving performance bottlenecks and issues.

T2.2 is needed to guarantee that the selected flagship code can reach good/excellent scaling performances across a wide range of heterogeneous hardware, without severe constraints (e.g. CUDA implementation that limit the availability on other accelerated platforms).



“Answer to the Recommendations” from WP2

R2

Tentative reporting table for code XXXX:

WP2 reporting table for D2.1		
Sub-Task	Name	Summary of the activities up to M12
2.2	Increasing the performance portability of flagship codes for different accelerators: Porting	Lorem ipsum dolor sit amet. Vel officiis esse vel incidunt earum qui distinctio provident est dolores esse aut velit sequi vel accusantium cumque. Sit reiciendis voluptates ex placeat fuga sit quod libero et quia facilis. Non natus dignissimos rem illo magni At quis fugit aut facilis sunt non obcaecati obcaecati qui consequatur rerum.
2.3	Optimisation for Exascale: workplan driven optimization	Qui vero quas ut incidunt omnis vel voluptatem culpa quo natus repellendus ut architecto deleniti ut consequuntur quisquam. Ex laboriosam mollitia qui voluptatem quia et praesentium debitis. Aut doloribus itaque vel consequatur officiis ut deleniti nulla vel itaque sint a consectetur autem eos sunt consequuntur vel itaque accusantium.

R3

Agree.



“Answer to the Recommendations” from WP2

R6

The close collaboration with POP3 is already in place. HLRS and BSC are part of the ChESEE-2P consortium and involved into WP2 stuff. However, some change in the methodology can be expected for D2.3 timeline.

As the real "issue" towards exascale is the size, the analysis already done in T2.1 needs to be refined taking into account the expected scalability (according to **capability or capacity execution**).

Infact, the usability of T2.1 techniques with a pre-exascale execution pose severe limitations: size of the traces, usability of scorep/extrae recipes at large scale, I/O, network... other considerations.

The use of TALP (possibly with GPU extension) to efficiently monitor the actual performance at scale (task T2.4) and the use of simplified POP metrics (available for some flagship code using application log intrinsics) are already part of WP2.



Next steps: D2.2 - T2.2

Increasing PP level of flagship codes across accelerated systems

	Activity	Driven by	Supported by	Additional Notes
I	Porting	Flagship Code Owners	CINECA	• Targets mini-app (T3.1 version) • Targets accelerated HPC systems (not exclusively EuroHPC) • Perf. Port. Tools • Activity is optional*
II	Performance Portability Campaign	CINECA	Flagship Code Owners	• PP metrics [S. Pennycook et al. "Navigating PP and P"]

Please upload/update the workplan at [ChEESE-2P_WORKPLANS_SACO_REPOSITORY](#)

*The porting activity is not mandatory; it will depend on various factors such as current portability status

Next steps: D2.2 - T2.3

Optimisation for exascale

	Activity	Driven by	Supported by	Additional Notes
I	Code-audit driven optimisation	Flagship Code Owners	CINECA	• Targets code-audited flagship code • Targets EuroHPC systems
II	Workplan driven optimisation	Flagship Code Owners	CINECA	• No bottlenecks may have emerged from the code-audit

Please upload/update the workplan at [ChEESE-2P_WORKPLANS_SACO_REPOSITORY](#)

Next steps: D2.2 different sub-tasks reporting period

- ❑ **Porting** is a huge step for D2.2. The reporting period for Porting activities in D2.2 is from the starting of the project to M24.
- ❑ **Performance portability campaign** is a must for all codes. The reporting period for this sub-task in D2.2 is from M13 to M24.
- ❑ **Optimization/tuning** is generally code audit driven (with some remarkable exception). The reporting period is respectively:
 - ❖ From M13 to M24 for code audit driven optimization
 - ❖ From M1 to M24 for workplan driven optimization
- ❑ **Some relevant activity will be performed and reported in the framework of D2.4 deliverable.**



Next steps: D2.2 overall "big picture"

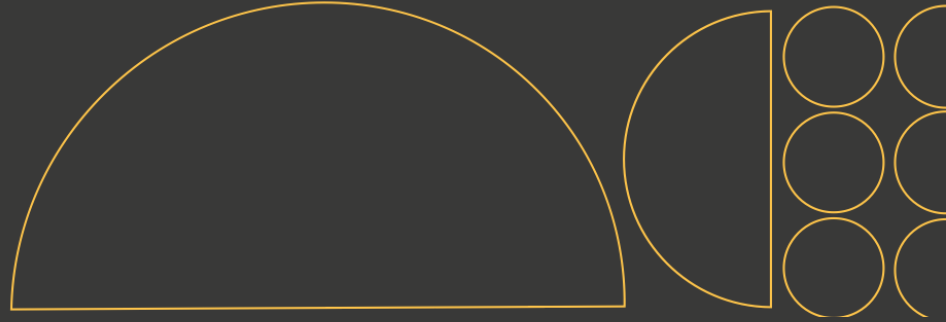
Flagship code	Porting	Performance portability campaign	Code audit driven optimization	Workplan driven optimization
SeisSol				
SPECFEM3D				
ExaHyPE				
Tandem				
xSHELLS				
HySEA				
FALL3D				
OpenPDAC				
LaMEM				
pTatin3D				
ELMER/ICE				

Workplans light directory under Saco:

https://saco.csic.es/index.php/s/5paFC4EyEfeKy7w?path=%2FWP2%2FCINECA%20WP2%20support%2FWORKPLANS_LIGHT



Thank you!



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<http://cheese2.eu>



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