



ChEESE

Flagship code presentation template: what to present for WP2 (D2.2)

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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.**



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"]

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



Just a friendly reminder...

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



Just a friendly reminder...

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				

Updated WORKPLANS_LIGHT directory for D2.2

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



Operating instructions for a **Performance Portability Campaign** (D2.2) for code XXXX

1. Choose among the two different approaches (see <https://cheese2.eu/wiki/images/2/23/T2.2.pdf>):
 - a. MaxPerf Approach. Goals:
 - i. ☐ Maximize performance using different accelerators
 - ii. ☐ Different extension for different devices
 - iii. ☐ NVIDIA: CUDA
 - iv. ☐ AMD: HIP
 - v. ☐ Intel: OneAPI
 - vi. ☐ Possible problem for external libraries (e.g., cuFFT)
 - b. AccDiff Approach. Goals:
 - i. ☐ Acceptable performance using different accelerators
 - ii. ☐ Using a single extension for different device (e.g., OpenACC, OpenMP target, SYCL,...)
 - iii. ☐ Suboptimal performance
 - iv. ☐ Different implementation to accomplish different hardware

Code XXXX choice: AccDiff approach (the only feasible, see code XXXX workplan light). MPI+OpenACC.

1. Hardware choice: Leonardo booster, LUMI-G, MareNostrum 5....

2. Available code XXXX versions:

- a. NVIDIA based version (NVIDIA hardware only)
- b. "performance portable" version (on-going)

3. **Performance Portability Campaign**

do i=1, H (number of available platforms)

- a. **strong and/or weak scaling campaign (according to your needs)**
- b. **application efficiency and/or architectural efficiency computation (see <https://ieeexplore.ieee.org/document/9484790>)**
- c. **(optional) optimization/tuning of the performance of the code XXXX versions as in 3.**
Optional use of profiling tools to find and solve performance bottlenecks. Goto a.

enddo

1. Performance Portability Metrics computation (table, plots...)
2. Lessons learned for code XXXX

EuroHPC or SDV resources needed

Just a
friendly
reminder...

What to present for WP2 (D2.2)

Simple answer: what have been done in the different subsections (Porting, Performance portability campaign and Optimization/tuning) to date. Proposals and suggestions:

- ❑ Try to highlight relevant activities (overall) with nice pictures, plots, scaling curves (in particular for the PPC)
- ❑ Try to clarify if an activity is on-going or already finalized
- ❑ PPC related:
 - PPC is a complex task. Remember that this activity is driven by CINECA (feel free to contact us for any doubt/request of clarification)
 - try to underline the preliminary work done to accomplish a PPC (code/mini-app installation, issues, EuroHPC, SDV machines selected...)
 - PPC aim to produce “numbers”. A PPC can be considered finalized when a satisfactory set of numbers on (possibly) different hardware have been produced



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❑ PPC related suggestions (again):

- Application efficiency computation is a reasonable initial choice for PPC.
- Application efficiency can be computed as the percentage of the best known performance (according to some metrics) previously demonstrated on a given platform.
- Strong or weak scaling can be used to find this value, assuming a certain "reasonable" scaling of the mini-app/application on a given platform
- Otherwise, only the best known performance (according to the same metrics as before) can be used in the case of execution restricted to a fixed number of GPUs/nodes (e.g. 1 GPU)



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❑ Final “golden rules”:

- Don't go into much details (those will be in D2.2 or following)
- Try to highlight when a given task (subtask) has been performed in cooperation with other WPs (to check and possibly enhance the connections between WP2 and the others)
- CINECA will summarize all the outcomes in the general WP2 presentation (in particular as a basis for urgent recommendations for the near future)

