

T2.4: recap from D2.2

- ❑ The primary objective of task T2.4 is to ensure continuous performance monitoring throughout the entire project, not limited to the code audit procedure handled by task T2.1. The main tool is TALP (<https://doi.org/10.1145/3452412.3462753>), developed and maintained by WP2 partner BSC. Task T2.4 has two key objectives:
 1. To support the development and enhancement of TALP by adding new features, extending its capabilities to GPU architectures and other stuff.
 2. To integrate TALP with (selected) flagship codes and mini apps from WP2.
- ❑ Task T2.4 is closely linked to the activities in T2.2 and T2.3. However, TALP is also expected to be utilized in other work packages, notably WP4, for certain Continuous Integration/Continuous Delivery (CI/CD) activities.
 1. and 2. are part of WP2 while CI/CD is in WP4. 1. is of course under BSC responsibility.

T2.4 after D2.2 (proposal TBD)

- ❑ Use the same strategy as in the Performance portability campaign (PPC) work done for D2.2
- ❑ New: Performance Monitoring campaign (PMC) to accomplish task T2.4 activities (2.)
- ❑ Extended team: BSC+code owners+CINECA+...
- ❑ Extended team as in https://saco.csic.es/index.php/s/5paFC4EyEfeKy7w?path=%2FWP2%2FCINECA%20WP2%20support%2FWORKPLANS_LIGHT (organized on a code by code basis, to be checked and renewed after D2.2)
- ❑ BSC could provide a template about the “correct” way to proceed and report activities of a PMC
- ❑ BSC is still working on the GPU integration with TALP so that T2.4 can start collaborating with the code owners.



ChEESA



FALL3D

Fall3D performance monitoring

Current performance monitoring

Use Cases: Inputs for audits and computational demanding scalability tests

Execution automation: Semi-automated tests via shell scripts

Metadata management: Execution metadata stored in a structured Git repository

Automated Reporting: JSON based processing for performance results

Advantages

Standardized Structure: Simplifies test replication across clusters

Centralized Repository: Ensures fast access to organized data

Enhanced Analysis: Facilitates comparisons between clusters or code versions

Drawbacks

Manual Effort: Initial setup require time.

Limited Automation: Current scripts have room for further automation

Next steps

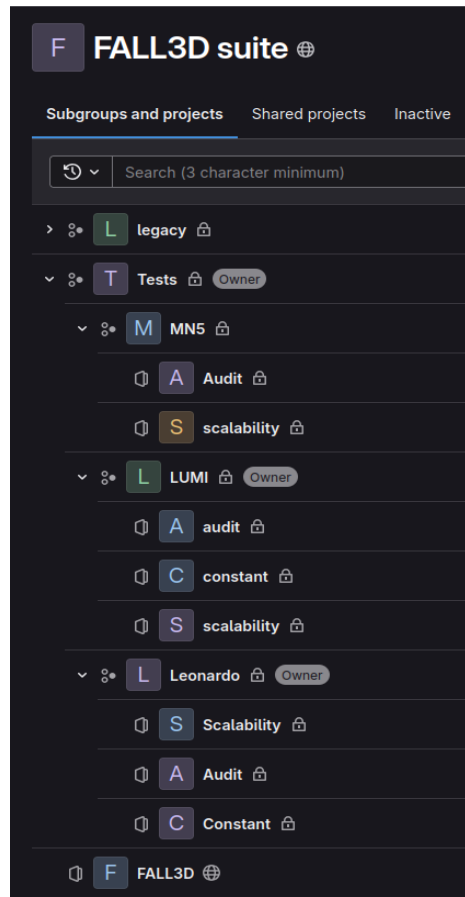
Performance monitoring: Integrate TALP to track and visualize performance metrics

POP metrics: Use TALP to obtain POP *kind* metrics on every code release

Artifact Management: Utilize TALP Pages to monitor code evolution directly in Git

TALP badge: Add TALP badge to README, highlighting performance metrics

WP4 overlap: Automatize all TALP processes within code CI-CD pipeline



Metadata repository

Metadata file

```
"test_data": {
  "test": {
    "comment": "New release ChEESE M22 - Fall3d 9.0"
  },
  "code": {
    "origin": "git@gitlab.com:fall3d-suite/fall3d.git",
    "version": "9.0/master",
    "branch": "master",
    "commitID": "d9063e20de9040c2388af600c6b094042132a0e4",
    "commitAuthor": "lmingari <lmingari@gmail.com>",
    "commitDate": "Wed Oct 23 20:59:08 2024 +0200"
  },
  "system": {
    "host": "MNS@BSC",
    "partition": "ACC",
    "nodeCPU": "80 cores Intel Xeon Platinum",
    "nodeGPU": "4 NVIDIA Hopper H100 64GB",
    "nodeRAM": "512 GB"
  },
  "modules": {
    "fortran": "nvidia-hpc-sdk/24.3",
    "cuda": "cuda/12.3",
    "mpi": "nvidia-hpc-sdk/24.3",
    "hdf5": "hdf5/1.14.1-2-nvidia-nvhpcx",
    "netcdf-c": "netcdf/c-4.9.2_fortran-4.6.1_cxx4-4.3.1-nvidia-nvhpcx",
    "netcdf-fortran": "netcdf/c-4.9.2_fortran-4.6.1_cxx4-4.3.1-nvidia-nvhpcx",
    "netcdf-parallel": "pnetcdf/1.12.3-nvidia-nvhpcx",
    "zlib": ""
  },
  "compilation": {
    "compilation": "cmake .. -DDETAIL_BIN=YES -DWITH-MPI=YES -DWITH-ACC=YES -DWITH-OPENMP=YES",
    "binary": "/gpfs/projects/bsc21/bsc412521/FALL3D/TESTS/test_audit/shared/bin"
  }
},
"runs": [
  {
    "MN02-01GPU": {
      "run": "test_scalability_MN02_01GPU",
      "gpus": 1,
      "tasks": 1,
      "ensembles": 1,
      "Mesh": "x: 1000, y: 1000, z: 100",
      "bins": "5: fine_ash-01 fine_ash-02 fine_ash-03 fine_ash-04 fine_ash-05",
      "npx": "1",
      "npz": "1",
      "wall time": "1306",
      "initialization time": "5",
      "computing time": "1301",
      "Ends": "ends NORMALLY",
      "error_lines": [
        "load HDF5/1.14.1-2 (PATH, LD_LIBRARY_PATH, LIBRARY_PATH, C_INCLUDE_PATH, ",
        "CPLUS_INCLUDE_PATH, HDF5_DIR, HDF5_ROOT) ",
        "load PNETCDF/1.12.3 (PATH, MANPATH, LD_LIBRARY_PATH, LIBRARY_PATH, ",
        "PKG_CONFIG_PATH, C_INCLUDE_PATH, CPLUS_INCLUDE_PATH) ",
        "load NETCDF/c-4.9.2_fortran-4.6.1_cxx4-4.3.1 (PATH, LD_LIBRARY_PATH, ",
        "LIBRARY_PATH, PKG_CONFIG_PATH, C_INCLUDE_PATH, CPLUS_INCLUDE_PATH, NETCDF_ROOT, ",
        "NETCDF_DIR) "
      ]
    },
    "MN02-02GPU": {},
    "MN02-04GPU": {},
    "MN02-08GPU": {},
    "MN02-16GPU": {},
    "MN02-32GPU": {},
    "MN02-64GPU": {}
  ]
}]
```

Report

M22 scalability tests

test

testType	test_scalability
testOwner	Heribert Pascual
note	Benchmark new gpu multiplatform version 9.0
comment	New release ChESEE M22 - Fall3d 9.0

code

origin	git@gitlab.com:fall3d-suite/fall3d.git
version	9.0/master
branch	master
commitID	d9063e20de9040c2388af600c6b094042132a0e4
commitAuthor	lmingari <lmingari@gmail.com>
commitDate	Wed Oct 23 20:59:08 2024 +0200

system

host	MN5@BSC
partition	ACC
nodeCPU	80 cores Intel Xeon Platinum
nodeGPU	4 NVIDIA Hopper H100 64GB
nodeRAM	512 GB

modules

fortran	nvidia-hpc-sdk/24.3
cuda	cuda/12.3
mpi	nvidia-hpc-sdk/24.3
hdf5	hdf5/1.14.1-2-nvidia-nvhpcx
netcdf-c	netcdf-c-4.9.2_fortran-4.6.1_cxx4-4.3.1-nvidia-nvhpcx
netcdf-fortran	netcdf-c-4.9.2_fortran-4.6.1_cxx4-4.3.1-nvidia-nvhpcx
netcdf-parallel	netcdf/1.12.3-nvidia-nvhpcx
zlib	

Run: MN02-16GPU

run	test_scalability_MN02_16GPU
gpus	16
tasks	16 (npx: 4, npy: 2, npz: 2)
ensembles	1
Mesh	x: 1000, y: 1000, z: 100
bins	5: fine_ash-01 fine_ash-02 fine_ash-03 fine_ash-04 fine_ash-05
wall_time	164
initialization_time	5
computing_time	159
Ends	ends NORMALLY
error_lines	

Run: MN02-32GPU

run	test_scalability_MN02_32GPU
gpus	32
tasks	32 (npx: 4, npy: 4, npz: 2)
ensembles	1
Mesh	x: 1000, y: 1000, z: 100
bins	5: fine_ash-01 fine_ash-02 fine_ash-03 fine_ash-04 fine_ash-05
wall_time	108
initialization_time	4
computing_time	104
Ends	ends NORMALLY
error_lines	

