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PIANO NAZIONALE DI RIPRESA E RESILIENZA

ICSC
Centro Nazionale di Ricerca in HPC, Big Data and Quantum Computing

WP1-2 coordination activities in 2024

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Spoke 3 II Technical Workshop, Bologna Dec 17 -19, 2024

WP1 - HPC codes enabling and optimization

Scope: selects a number of codes that require intensive computational resources to face the next generation of scientific challenges and performs their redesign, reimplementation and optimisation in order to effectively exploit state-of-the-art HPC solutions.

T1.1: **Selection**, Analysis and testing of codes

T1.2: Software **development**, refactoring and optimization

T1.3: Integration, Verification and Validation

24 Active use cases
were 21 at the Trieste meeting (2023)

WP2 - Design of innovative algorithms, methodologies and codes towards exascale and beyond

Scope: This WP identifies innovative algorithms and methodologies upgrading their capability to exploit, and scale on, the exascale and post exascale architectures, reintegrating the resulting improved features in codes, workflows and pipelines. The energy impact will also be specifically considered.

T2.1: **Science cases definition**, algorithms **identification**, parallelism level assessment and profiling

T2.2: **Algorithms co-design** and methodologies to scale-up the capabilities of the algorithms and to find new innovative solutions

T2.3: Design of **new architectural solutions** aimed at the exploitation of post-exascale infrastructure

T2.4: Algorithms and methodologies **integration** into new big-data analysis applications

Activity Tracked monthly

- https://l.infn.it/usecases-wp1-2 : Use Case descriptions - official WP1/2 list
- https://indico.ict.inaf.it/category/209/ : Meetings Indico page
- https://www.openaccessrepository.it/communities/spoke3_wp12/ : Products repository
- https://l.infn.it/rendicontazione-wp2 : KPI & Targets WP2
- https://l.infn.it/rendicontazione-wp1 : KPI & Targets WP1

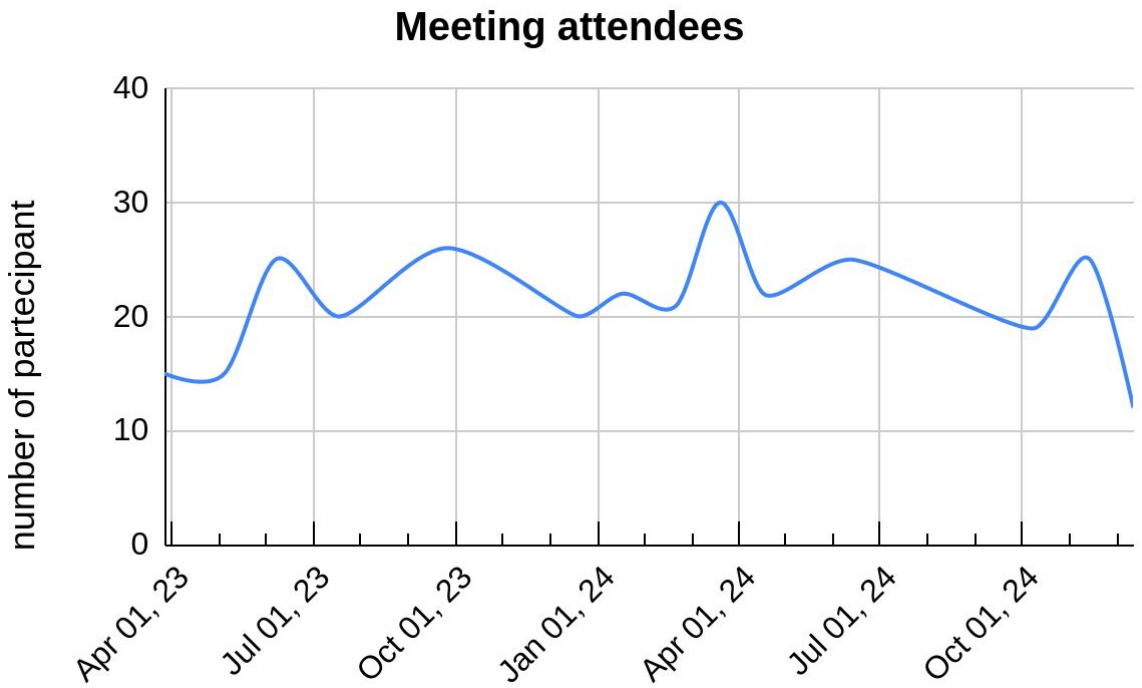
WP Meetings

16 WP meetings

15 Long reports

WP meeting Format:

- **Communications from WP leads**
- **1-2 Speakers reporting on two different use cases for 40 minutes**
- **Round table of all use cases**



	WP present.	Elba Meeting	Bo Meeting
ISTEDDAS	1	1	
HIP-POP	1	1	1
PLUTO	1	1	
TURBO		1	
COSMICA		1	1
CAMB_GPU	1		1
NP_TMCode	1	1	1
21cmFAST		1	1
Mercury-Arxes	1	1	1
GUIBRUSH(R)	1	1	1
RAMSES	1	1	1
BrahMAP-	1	1	1
Sparse	1	1	1
RICK	1	1	1
PRESTO		1	1
GalaPy	1	1	1
OpenGadget		1	2
PINOCCHIO	1	1	1
STINGRAY		1	1
RAMSES- SNS	1		
PBJ/StratLearn	1	1	1
LiteBird-Sim		1	1
TEPID-WINE			1

Today's Talks

WP1	Andrea Sabatucci	Assessing the relevance of systematics in the LiteBIRD mission.
	Avinash Anand	BrahMap: A scalable map-making framework for the future CMB experiments
	Alice Damiano	Constraints on the sinking timescales of massive black holes using the OpenGadget3 code
	Emanuele De Rubeis	Evolution of RICK into a robust, user-ready, library for interferometric imaging
	Gloria Guilluy	GUIBRUSH(R): updates and future prospects
	Paolo Matteo Simonetti	Parallelizing the Mercury-ArXes code using OpenACC
	Marius Daniel Lepinzan	PINOCCHIO Code: Latest Developments and GPU Transition
	Raffaele Pascale	RAMSES GPU updates
	Andrea Possenti	Search for orbital modulated periodic signals in radio timeseries; evaluating CPU vs GPU codes
	Eleonora Veronica Lai	Stingray 3.0: A parallel Python library for spectral-timing
	Giovanni Cavallotto	COSMICA: a novel parallel GPU code for Cosmic Rays propagation in heliosphere
WP2	Giovanni La Mura	Nano-Particle Transition Matrix code
	Simone Ferretti	Sparse representations for spectral image algorithms
	Matteo Bachetti	Stingray: spectral timing for all
	Federico De Luca	TEPID-WINE - photoionization modeling and spectral fitting
	Milena Valentini	The OpenGADGET3 code: updates

3 contributors present in WP3 session

2 contributors present also a KSP

Next WP1-2 meeting

January 9th, 2025 - Eleonora Lai (TBC)

Summary and Criticalities

- Activities of WP1 and 2 are on a good track -> see Reviewer Comments
- Advances to confidently have a >90% success rate of achieving the preset milestones
- **Though resources haven't been given yet, the participants of WP1 and 2 are very good CPU and GPU scavengers! Kudo's to them!**