



PROGRAMME
DE RECHERCHE
NUMÉRIQUE
POUR L'EXASCALE

Digital for Exascale Energy management (WP6)

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Exa-Soft General Meeting 2025
September, 24, 2025

Work carried out since last General meeting

- Meetings:
 - July, 2, 2024, annual meeting with WP5
 - March, 27, 2025, on activities coordination (GT, Inpex, WG6)
 - Avril, 7, 2025, on cluster scheduling
- Publications: SusCom2025, TPDS2025, Cluster2025, IPDPSw2025
- DataSet publication: <https://zenodo.org/records/14914799>
- Dissemination during events: 2nd Workshop on Scheduling Variable Capacity Resources for Sustainability
- Measurement methods sheets: <https://hal.science/hal-05272179>
- Animation of Energy GT

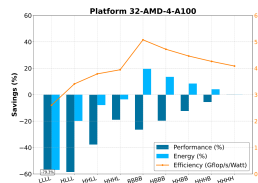
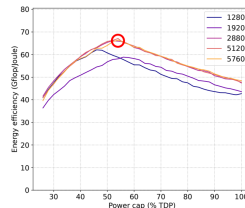
Recruitments

- PhD: Jules Risse (November 2024), Albert d'Aviau (October 2023), Jules Evans (April 2025), Assia Mighis (September 2025)
- Engineer: Increase TRL of PhDs work toward the end of the project
- Master internships:
 - sched_ext (O/S scheduling), May-August 2025
 - replay with feedback (tools for simulation), May-August 2025

Results (existing)

At the node level :

- Models for tasks energy consumption (μ s) based on large-grain measurements (100 ms) (see WP5)
- Models for impact of DVFS on power, time and energy
- Scheduling in runtime systems
- GPUs are more energy efficient when power capped
 - Use StarPU performance models to schedule
 - tasks on GPUs with different power budgets



[IPDPS Workshop HCW'25]

Results (Ongoing)

- At the node level :
 - Balance power budget from CPUs to GPUs under power cap constraints
 - Design an energy efficient scheduling algorithm in StarPU
 - Find the optimal frequency for the CPUs
- At the cluster level :
 - Power, performance, energy measurements under DVFS
 - Open access dataset and energy models [10.5281/zenodo.10982238](https://zenodo.org/record/10982238)
 - Tasks placement at the platform level
 - Scheduling with lightweight predictions in power-constrained HPC platforms (TPDS 2025)

Link with demonstrators

Integration in the Exa-SofT software stack:

Software	Status	Integration in the software stack	Usable in other WP/PC ?
DUF	Prototype		Yes
MojitO/S	Prototype	Ongoing integration with alumet	Yes

Energy GT

- Specify needs for the Jules Verne upcoming supercomputer
- Gather information from constructors to adapt our models
- Propose a methodology for Power/Energy/CO2 impact measurements for the whole project
- Definition of a training course on measuring impact of supercomputers during their whole life cycle (from raw material extraction to recycling)
- Planned events
 - Energy-tutorial@YoungPex meeting in Toulouse
 - *Le numérique viable* day during **Trans-numériques** at Rennes on February (inter-PEPR meeting)

Bottlenecks

- Difficulties to recruit: T1-T2 2025, recruitment of 2 phd students