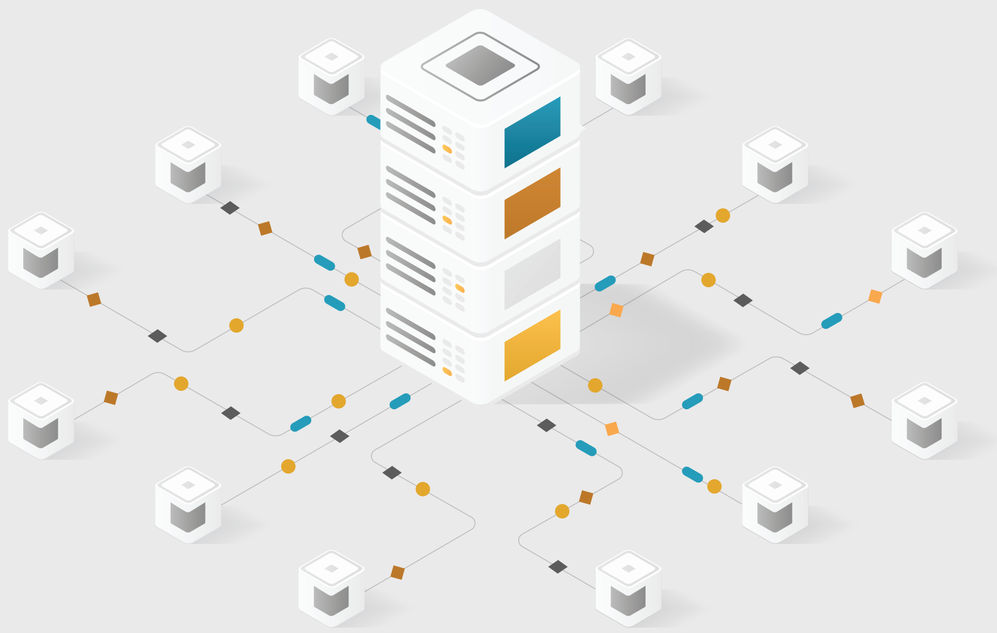
SPARCITY

An Optimization and Co-design Framework for Sparse Computation

SparCity aims to create a supercomputing framework to provide efficient algorithms and coherent tools to maximize the performance and energy efficiency of sparse computations on emerging HPC systems.

It also opens up new usage areas for sparse computations in data analytics and deep learning.



6 Partners

- Koç University
- Sabancı University
- Simula Research Laboratory
- INESC-ID
- LMU
- Graphcore*

4 Countries

- Turkey
- Portugal
- Norway
- Germany

3 Workshops

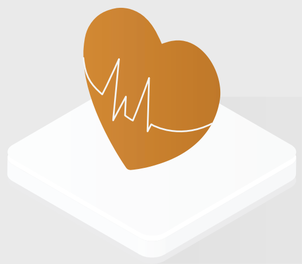
- ML methods at HIPEAC23
- Performance tools at EuroPar23
- Future is Sparse at Supercomputing23

Objectives

- Developing a comprehensive set of profiling tools for analyzing application performance;
- Devising topology-aware partitioning algorithms, boosting the efficiency of system-level parallelism;
- Allowing advanced optimization for massive and heterogeneous parallel architectures;
- Creating digital "SuperTwins" of supercomputers, simulating hardware scenarios and gathering real-time performance data;
- Demonstrating the effectiveness of the SparCity framework through its four real-life but challenging applications;
- Delivering a robust, well-supported and documented SparCity framework to end-users in industry and academia.

*until Month21

Use Cases



Cardiac Modelling

Detection of Digital Wildfires

High-order Epistasis Detection

Autonomous Driving

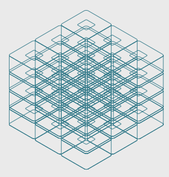
Software Tools for Sparse Computations

The SparCity Project pushes the frontier of how to assess and design hardware and software for High-Performance Computing.

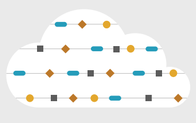
Because we know collaboration is at the heart of progress, outcomes of this project are a series of open-source tools, benefiting the scientific community.

You are free to use:

SparseBase
A pre-processing library for sparse computation



SuperTwin
A Digital Twin of a supercomputer



Codebase
Where you can access codes for various tools and frameworks that fall into three categories:

- Performance monitoring tools;
- Topology and communication optimization tools;
- Benchmarks for sparse computations.

Visit our website, take a look at our social media and subscribe to our newsletter to learn about this project that will change Europe!

github.com/sparcityeu @sparcity_eu /sparcity-project-944b4320a/

EuroHPC Joint Undertaking

This project has received funding from the EuroHPC JU under grant agreement No 956213, TUBITAK (Grant No 120N003 and 220N254), the Research Council of Norway, German Federal Ministry of Education and Research (BMBF) under grant number 16HPC045 and Fundação para a Ciência e a Tecnologia.