15th JLESC Workshop



Contribution ID: 61

Type: Poster

## Ginkgo —a High-Performance Portable Numerical Linear Algebra Software

Tuesday 21 March 2023 18:30 (1 hour)

Numerical linear algebra building blocks are used in many modern scientific applications codes. Ginkgo is an open-source numerical linear algebra software that is designed around the principles of portability, flexibility, usability, and performance. The Ginkgo library is integrated into the deal.II, MFEM, OpenFOAM, HYTEG, Sundials, XGC, HiOp, and OpenCARP scientific applications, ranging from finite element libraries to CFD, power grid optimization, and heart simulations. The Ginkgo library grew from a math library supporting CPUs and NVIDIA GPUs to an ecosystem that has native support for GPU architectures from NVIDIA, AMD, and Intel, can scale up to hundreds of GPU. One of the keys to this success is the rapid development and availability of new algorithmic functionalities in the Ginkgo library such as, but not limited to, Multigrid preconditioner, advanced mixed-precision iterative solvers and preconditioners, a sparse iterative batched functionality, sparse direct solvers, and the distributed MPI-based backend. In this poster, we will expose Ginkgo's library design, performance results on a wide range of hardware, and integration within key applications.

## **JLESC topic**

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Session Classification: Poster Session

Track Classification: Numerical methods and algorithms