

## **MAGMA: Matrix Algebra on GPU and Multicore Architectures**

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Many modern high-performance computers are based on multicore or manycore processors equipped with accelerators or co-processors such as NVIDIA or AMD GPUs, and Intel Xeon/Phi processors. In order to harness the computing power of such hybrid node architectures, MAGMA extends Linear Algebra PACKage (LAPACK) which is used as building blocks in many scientific and engineering simulations. In this talk, we give a high-level introduction to MAGMA and discuss the recent developments in the software package. In addition, as case-studies of using MAGMA for solving large-scale problems on a hybrid CPU/GPU cluster, we present our recent studies with a communication-avoiding variant of a preconditioned Krylov method for solving a large-scale linear system of equations, and our studies on a randomized algorithm to compute a low-rank approximation of a large-scale sparse matrix.

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