

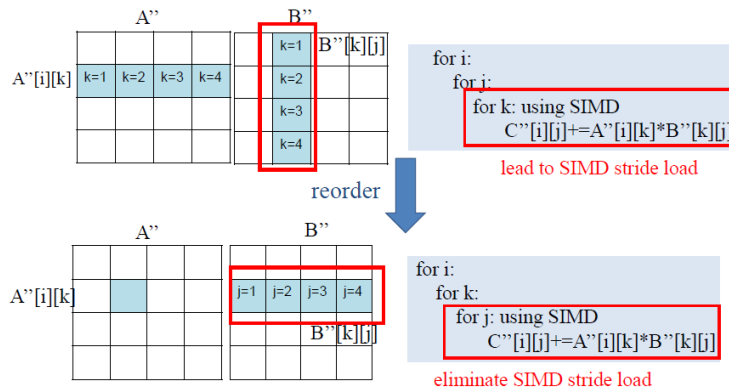
SpAMM: Optimizing Large-Scale Sparse Approximate Matrix Multiplication on Sunway Taihulight

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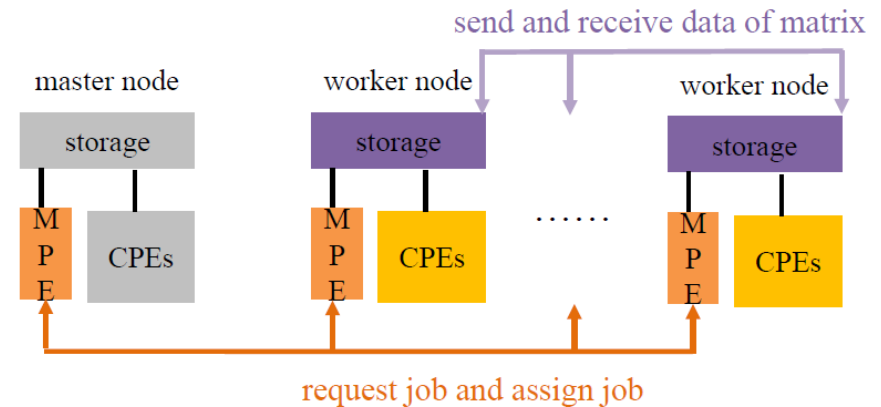
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Problems & Ideas

- Problems of SpAMM on Sunway TaihuLight:
 - No existing work learning about SpAMM on Sunway TaihuLight.
 - Needs hardware-specific optimization.
 - Needs careful design to improve intra-node and inter-node parallelism.
- Ideas: Propose swSpAMM, an optimized SpAMM algorithm for large-scale decay matrix multiplication tailored for Sunway Taihulight supercomputer.



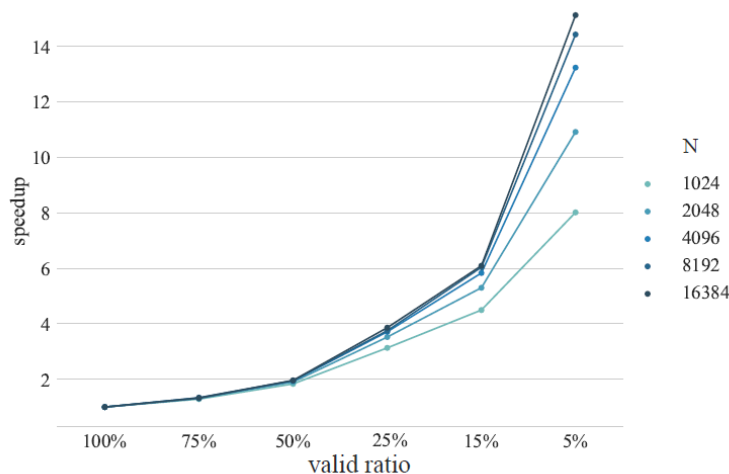
hardware-specific optimization



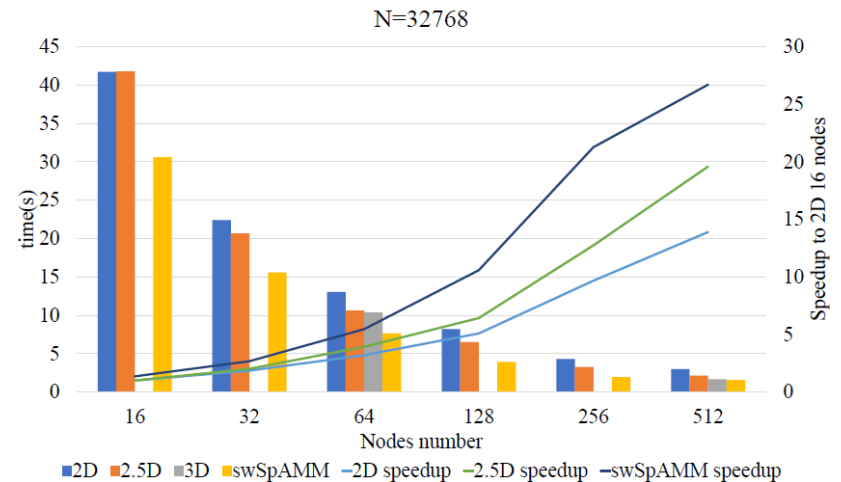
Scheduler for swSpAMM

Main Contributions

- Contributions:
 - We propose a unique task scheduling strategy to increase the parallel efficiency on a single node (one CG). We also adopt a fine-grained data layout transformation as well as architecture-specific optimizations for better performance;
 - We propose a computation scheduling strategy based on the Master-Worker model to increase parallel efficiency and achieve load balance. We design a large-scale communication scheme with a memory pool to optimize the storage usage and parallelization.



The speedup of swSpAMM with algebraic decay compared with xMath.



The performance comparison with existing large-scale GEMM algorithm when matrix size N=32768.