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Addressing Challenges to Scalability in Parallel Algebraic Multigrid

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With single-core performance no longer increasing, future performance gains in computers will need to come from increased parallelism. The same applies for applications, including algebraic multigrid solvers. As a result, scalability on larger parallel machines is critical. In this talk, we review the current state of parallel algebraic multigrid and present performance models to highlight the challenges it is currently facing, which center around an increasing communication burden and an increasing number of idle processors on coarse grids. We then discuss how these problems might be overcome by utilizing redundant data distribution across otherwise inactive processors and through the use of additive multigrid.