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Applications Development for the Roadrunner Hybrid Supercomputer

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Roadrunner is a hybrid supercomputer that will be installed at Los Alamos National Laboratory (LANL) in 2008. It will be the world's first general purpose machine to achieve a sustained petaflop. Roadrunner reaches this level of performance by boosting a conventional Opteron cluster–of–clusters with IBM Cell processors. Prior to embarking on this new architectural path, LANL commisioned the Roadrunner Advanced Algorithms Team to adapt several important codes to Roadrunner's projected architecture. The speedups demonstrated on prototype hardware and software were part of the conclusion that a hybrid, heterogeneous supercomputer is programmable and can support the Laboratory's national security mission. This presentation describes the programming models and selected techniques used by the Roadrunner Advanced Algorithms Team in carrying out this work.