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Quantum Computing Architectural Design JACOB WEST, GEOFFREY SIMMS, MARK GYURE, HRL Laboratories, LLC. Malibu, CA — Large scale quantum computers will invariably require scalable architectures in addition to high fidelity gate operations. Quantum computing architectural design (QCAD) addresses the problems of actually implementing fault-tolerant algorithms given physical and architectural constraints beyond those of basic gate-level fidelity. Here we introduce a unified framework for QCAD that enables the scientist to study the impact of varying error correction schemes, architectural parameters including layout and scheduling, and physical operations native to a given architecture. Our software package, aptly named QCAD, provides compilation, manipulation/transformation, multi-paradigm simulation, and visualization tools. We demonstrate various features of the QCAD software package through several examples.

Jacob West

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