An Efficient Post-Synthesis of Reversible Circuits

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Abstract

The theory of reversible circuits is fundamental for quantum computing, since the postulates of quantum mechanics establish that the evolution of closed quantum systems is unitary and thus reversible. The process of transforming a given reversible function into a reversible circuit is known as circuit synthesis and its optimization process is known as post-synthesis. We present a post-synthesis algorithm to reduce the gate count of reversible circuits. Our method identifies each maximal sub-circuit with up to three different lines, finds the permutations associated and replaces them with minimum sub-circuits. Our method successfully optimized most circuits well-known benchmark functions.

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