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HHL Algorithm on the Honeywell H1 Quantum Computer

Adrik B. Herbert
Purdue University, herbert8@purdue.edu

Eric A. F. Reinhardt
Purdue University, ereinha@purdue.edu

Abstract

The quantum algorithm for linear systems of equations (HHL algorithm) provides an efficient tool for finding solutions to systems of functions with a large number of variables and low sensitivity to changes in inputs (i.e. low error rates). For complex problems, such as matrix inversion, HHL requires exponentially less computational time as compared with classical computation methods. HHL can be adapted to current quantum computing systems with limited numbers of qubits (quantum computation bits) but a high reusability rate such as the Honeywell H1 quantum computer. Some methods for improving HHL have been proposed through the combination of quantum and classical computing methods. Here we present an implementation of HHL designed for the 10-qubit Honeywell H1 in the OpenQasm quantum computing language as well as some proven hybrid computing approaches for reduction of required qubits on the honeywell H1.