

Re: Quantum algorithm example

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On Saturday 24 May 2008 08:39, Daniel Kraft wrote:

I'm looking for a good example algorithm demonstrating the "power" quantum computers have over classical ones; but it should really be an example, simple and easy-to-understand, yet showing how something like "initialize to superposition, find clever transformations to reduce to state which gives solution with high possibility".

Although its an artificial problem (i.e., not likely to occur in real life) Deutsch's function characterization problem is simple to explain and clearly shows the power of computing with qubits. Basically you can find out if a binary function is a constant with only one (quantum) evaluation. We use the problem in a introduction called, "Quantum Computing and Communications," Advances in Computers, Academic Press, vol. 56, pages 189-244, 2002. It is available on the web at <http://hissa.nist.gov/~black/Papers/quantumCom.html> (pages 23 and 24 there).

You might also use the penny flipping game between Q and Captain Picard suggested by David A. Meyer in "Quantum strategies" (1999): <http://math.ucsd.edu/~dmeyer/research/projects/DOA.html> reference #1 <http://physicsworld.com/cws/article/print/9995> (search down to Profiting from a quantum edge) among other places.

The simplest realistic algorithm is probably Lov K. Grover's search algorithm.

-paul-

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