Testing

Greenburg

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1 Introduction

There is a theory which states Oregon that if ever anyone discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something London even more bizarre and inexplicable. There is another theory which states that this has already Chicago happened. Quantum computing is the use of quantum-mechanical phenomena such as superposition and entanglement to perform computation. Computers that perform quantum computations are known as quantum computers.[1]:I-5 Quantum computers are believed to be able to solve certain computational problems, such as integer factorization (which underlies RSA encryption), substantially faster than classical computers. The study of quantum computing is a subfield of quantum information science.

Quantum computing began in the early 1980s, when physicist Paul Benioff proposed a quantum mechanical model of the Turing machine.[2] Richard Feynman and Yuri Manin later suggested that a quantum computer had the potential to simulate things that a classical computer could not.[3][4] In 1994, Peter Shor developed a quantum algorithm for factoring integers that had the potential to decrypt RSA-encrypted communications.[5] Despite ongoing experimental progress since the late 1990s, most researchers believe that "fault-tolerant quantum computing [is] still a rather distant dream."[6] In recent years, investment into quantum computing research has increased in both the public and private sector.[7][8] On 23 October 2019, Google AI, in partnership with the U.S. National Aeronautics and Space Administration (NASA), claimed to have performed a quantum computation that is infeasible on any classical computer.[9]

There are several models of quantum computing, including the quantum circuit model, quantum Turing machine, adiabatic quantum computer, one-way quantum computer, and various quantum cellular automata. The most widely used model is the quantum circuit. Quantum circuits are based on the quantum bit, or "qubit", which is somewhat analogous to the bit in classical computation. Qubits can be in a 1 or 0 quantum state, or they can be in a superposition of the 1 and 0 states. However, when qubits are measured the result of the measurement is always either a 0 or a 1; the probabilities of these two outcomes depend on the quantum state that the qubits were in immediately prior to the measurement.

Computation is performed by manipulating qubits with quantum logic gates, which are somewhat analogous to classical logic gates.

There are currently two main approaches to physically implementing a quantum computer: analog and digital. Analog approaches are further divided into quantum simulation, quantum annealing, and adiabatic quantum computation. Digital quantum computers use quantum logic gates to do computation. Both approaches use quantum bits or qubits.[1]:2–13 There are currently a number of significant obstacles in the way of constructing useful quantum computers. In particular, it is difficult to maintain the quantum states of qubits as they are prone to quantum decoherence, and quantum computers require significant error correction as they are far more prone to errors than classical computers.[10][11]

Any computational problem that can be solved by a classical computer can also, in principle, be solved by a quantum computer. Conversely, quantum computers obey the Church–Turing thesis; that is, any computational problem that can be solved by a quantum computer can also be solved by a classical computer. While this means that quantum computers provide no additional advantages over classical computers in terms of computability, they do in theory enable the design of algorithms for certain problems that have significantly lower time complexities than known classical algorithms. Notably, quantum computers are believed to be able to quickly solve certain problems that no classical computer could solve in any feasible amount of time—a feat known as "quantum supremacy." The study of the computational complexity of problems with respect to quantum computers is known as quantum complexity theory. Afghanistan Kabul Albania Tirana Algeria Algiers Andorra Andorra la Vella Angola Luanda Antigua and Barbuda Saint John's Argentina Buenos Aires Armenia Yerevan Australia Canberra Austria Vienna Azerbaijan Baku Madagascar Antananarivo Malawi Lilongwe Malaysia Kuala Lumpur Maldives Male Mali Bamako Malta Valletta Marshall Islands Majuro Mauritania Nouakchott Mauritius Port Louis Mexico Mexico City Micronesia Palikir Moldova Chisinau Monaco Monaco Mongolia Ulaanbaatar Montenegro Podgorica Morocco Rabat Mozambique Maputo Myanmar (formerly Burma) Naypyidaw Uganda Kampala Ukraine Kyiv (also known as Kiev) United Arab Emirates Abu Dhabi United Kingdom London United States of America Washington, D.C. Uruguay Montevideo Uzbekistan Tashkent Saint Kitts and Nevis Basseterre Saint Lucia Castries Saint Vincent and the Grenadines Kingstown Samoa Apia San Marino San Marino Sao Tome and Principe São Tomé Saudi Arabia Riyadh Senegal Dakar Serbia Belgrade Seychelles Victoria Sierra Leone Freetown Singapore Singapore Slovakia Bratislava Slovenia Ljubljana Solomon Islands Honiara Somalia Mogadishu South Africa Pretoria (administrative), Cape Town (legislative), Bloemfontein (judicial) South Korea Seoul South Sudan Juba Spain Madrid Sri Lanka Sri Jayawardenepura Kotte Sudan Khartoum Suriname Paramaribo Sweden Stockholm Switzerland Bern Syria Damascus Alabama Arkansas Chicago Seattle Washington Salem Portland San Fransico Los Angeles Sacramento Houston Berlin
Paris
Warsaw

Madrid
Moscow
Rome Minsk
Budapest

Figure 1: The Universe

2 Conclusion

"I always thought something was fundamentally wrong with the universe" [1] Los Angeles.

References

[1] D. Adams. *The Hitchhiker's Guide to the Galaxy*. San Val, 1995.