How Classical ,Super and Quantum Computers Work

Avi N. Peran

Introduction

Computers are a big part of our daily lives. From school to offices to-home, we are all using computers. You probably have a desktop or laptop computer in your house. You also probably have a cellphone in your house. Believe it or not it's a computer. However, you don't have a super computer and definitely not a quantum computer.

In my presentation I will explain how Classical computers, Super computers and Quantum computers work and compare them to one another.

Motherboard and CPU -
computer brain

$10^9 = 1,000,000,000$ operations per second

Monitor

keyboard

Power supply

Supercomputers - race between countries

10^{17} operations per
second

Transistors and switches are inside CPU - the brain of all classical computers, from phone to supercomputers

0	1	1	0	0	1
					1
2^5	2^4	2^3	2^2	2^1	2^0

Quantum computers

10^{23} operations per second

Quantum supremacy in quantum computers

[https://drive.google.com/file/d/1sDfrckDZseqpciQoODMf2MlnYc0p0vzR/view?
resourcekey](https://drive.google.com/file/d/1sDfrckDZseqpciQoODMf2MlnYc0p0vzR/view?resourcekey)

Quantum entanglement

You can Program a Quantum computer too!

<https://quantum-computing.ibm.com/>

Conclusion

- Computers are a very big help in our lives
- Classical computers are widely used
- In addition, super computers help us figure out difficult calculations like cryptography or predicting how a disease propagates around the world
- However, quantum computers are more powerful than any supercomputers. And they can solve problems that we've never done before. For example design a new chemical compound of medicine, analyze genome, or find a way to combat a virus
- So from a phone to a quantum computer, computers are running everywhere!

Bibliography

- [1] "Computer Basics: What Is a Computer?" *GCFGlobal.org*, edu.gcfglobal.org/en/computerbasics/what-is-a-computer/1/.
- [2] "Computers for /The Basics." *Computers for Beginners/The Basics - Wikibooks, Open Books for an Open World*, en.wikibooks.org/wiki/Computers_for_Beginners/The_Basics
- [3] Fisher, Chris, and Eric Abenojar. "IBM: What Is Quantum Computing?" *IBM Quantum*, 2 Apr. 2009, www.ibm.com/quantum-computing/learn/what-is-quantum-computing/.
- [4] Gunter, Elsa L. "Computer." World Book Student, World Book, 2020, worldbookonline.com/student-new/#!/article/home/ar127860/Cpu
- [5] Chubb, Jennifer C. "Quantum computing." World Book Student, World Book, 2020, worldbookonline.com/student-new/#!/article/home/ar757070/quantum%20computers
- [6] Australian Research Council Gate based Quantum Computers.
University of Bristol (Quantum in the Cloud Documentation)
Center for Quantum Computing and Communication Technology University of New South Wales (<http://www.cqc2t.org/>)
- [7] University of Science and Technology (China) China hits milestone in developing quantum computer
- [8] Author's in-person interviews with three IBM researchers at IBM Watson Quantum computers research center, Yorktown Heights, NY, USA