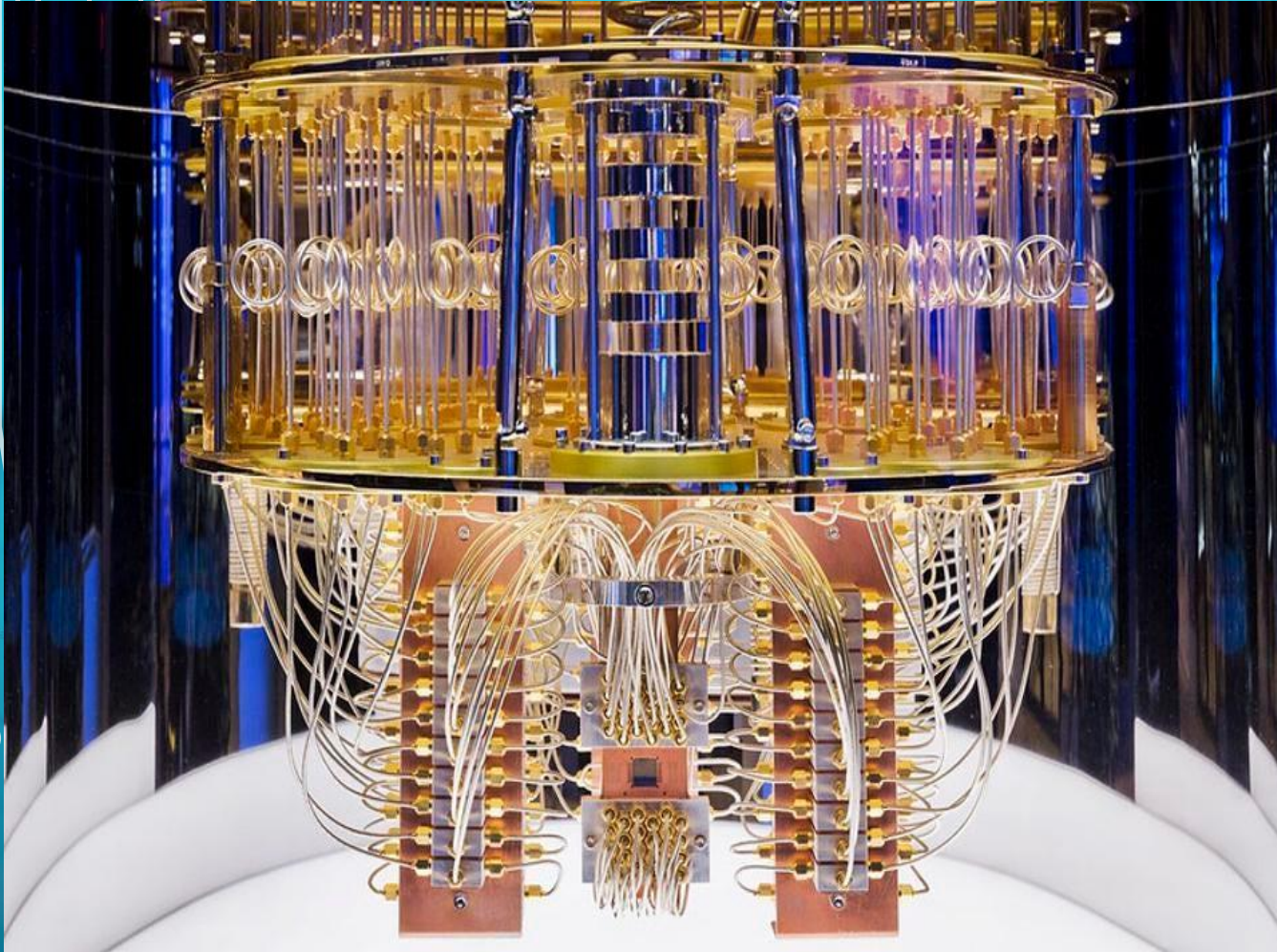


QUANTUM COMPUTER

NGUYEN VANTAI



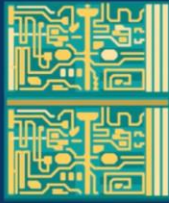
QUANTUM COMPUTER

- What's quantum computing ? and why do we need them ?
- How does it work ?
 - Qubit
 - Superposition
 - Entanglement
 - Quantum circuits
 - Example a maze
- Limits and benefits of quantum computer .

COMPUTER TECHNOLOGY TODAY



1960s



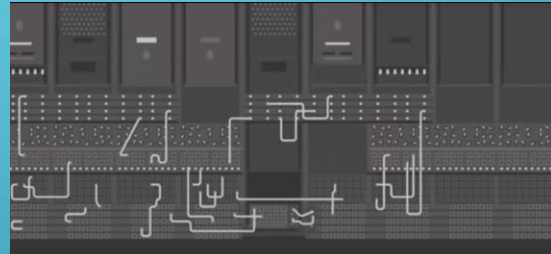
1970s



1980s



Today



1960s



1970s



1980s



Today

COMPUTER TECHNOLOGY TODAY



7-nanometer process technology

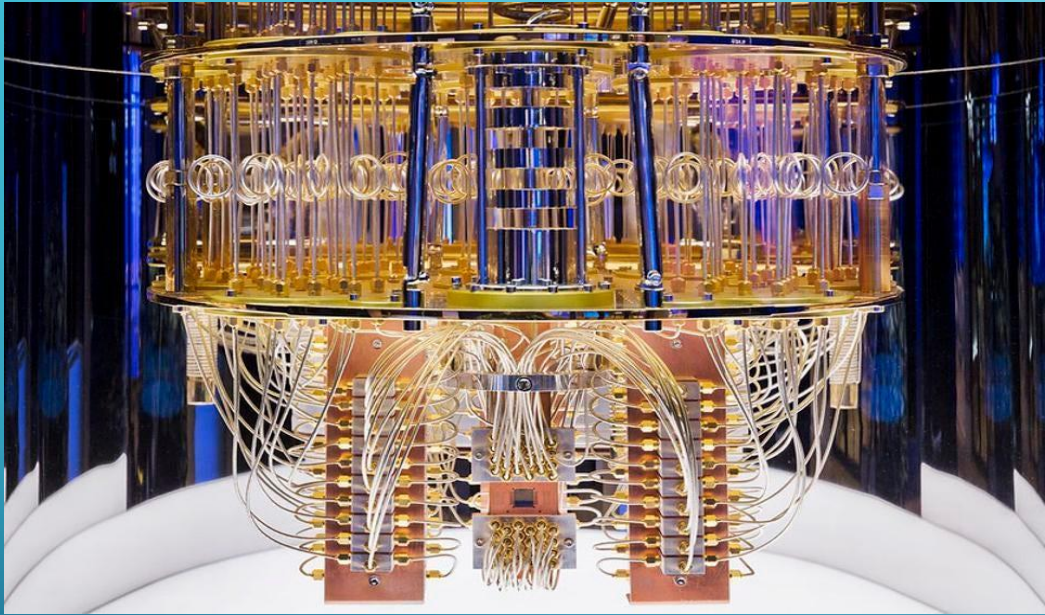


What are the limits of human technology ?

A decorative graphic on the left side of the slide, consisting of a network of white lines and small circles on a blue gradient background, resembling a circuit board or neural network.

WHAT'S QUANTUM COMPUTING ?

WHAT'S QUANTUM COMPUTING ?



Quantum Computer

Technology based on the principles of quantum theory.



Supercomputer

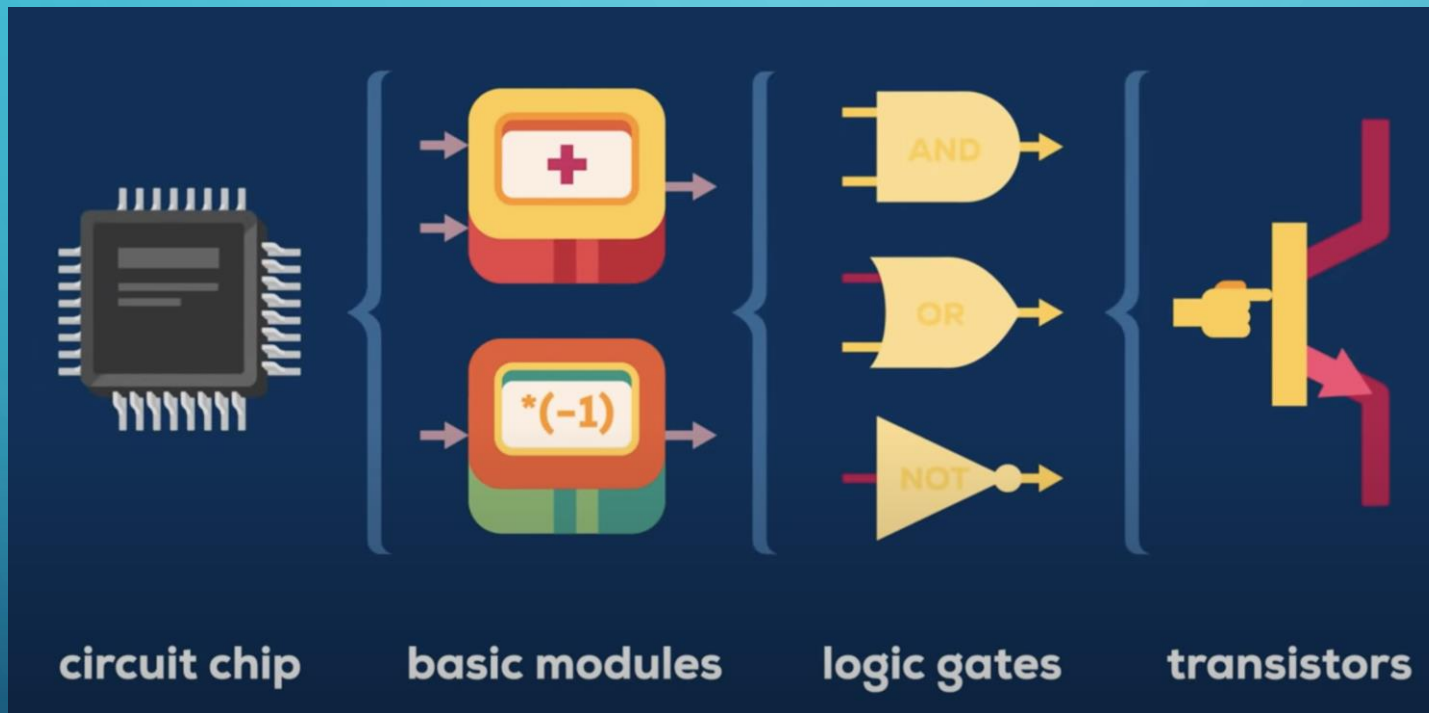
A computer with thousands of classical CPU and GPU cores.

An abstract graphic on the left side of the slide, consisting of a network of white lines and small circles on a blue gradient background. The lines and circles resemble a circuit board or a neural network, with some lines extending from the top and others from the bottom.

HOW DOES IT WORK ?

HOW DOES IT WORK ?

A classical computer



Components of computer :

- Main memory
- Arithmetic unit
- Control unit

BITS AND QUBITS

BITS



low charge



high charge

For classical bits can be in one of two to the power of four different configurations at a time, that's 16 possible combinations, out of which you can use just one.

QUBITS



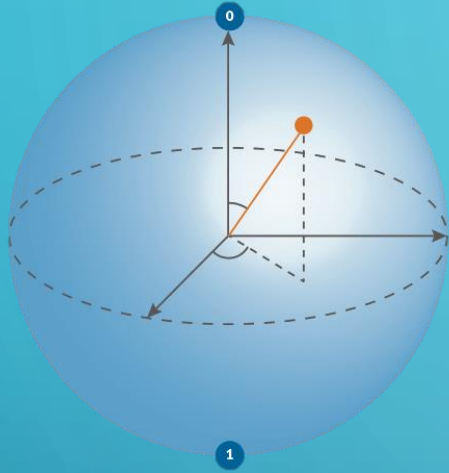
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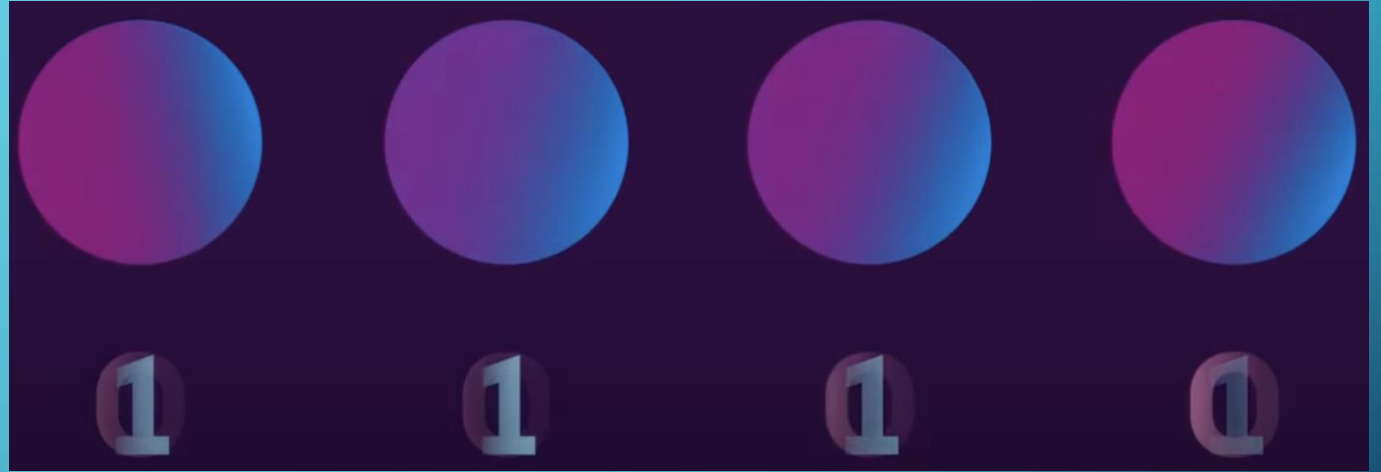
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For qubits in superposition, however can be in all of those 16 combinations at once.

SUPERPOSITION

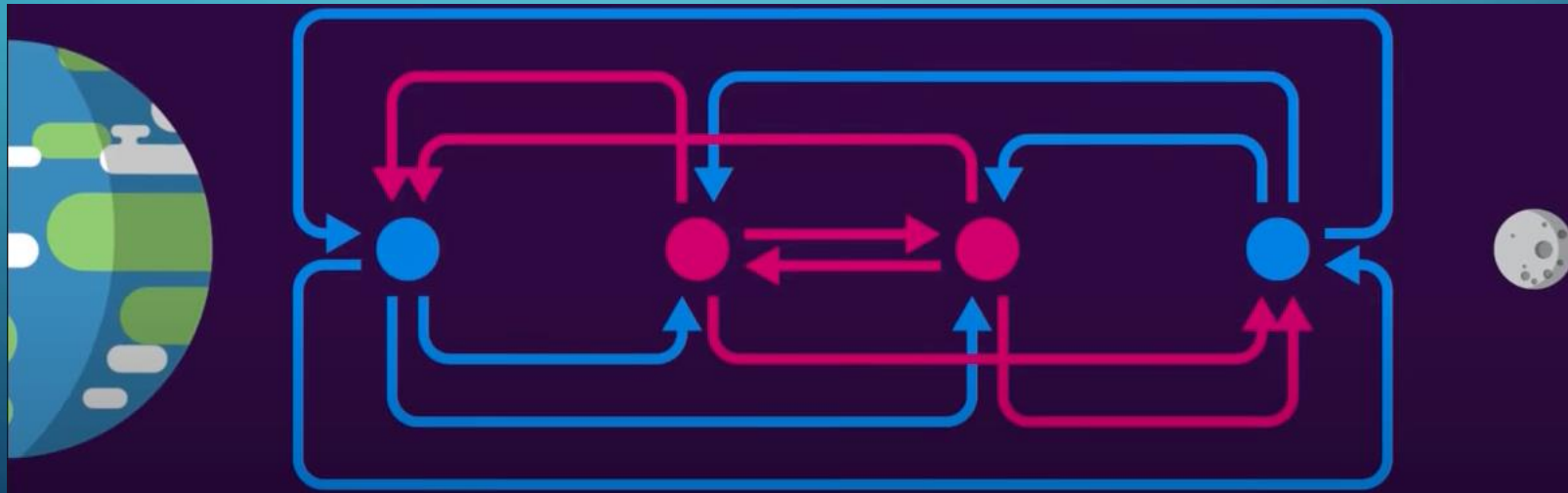
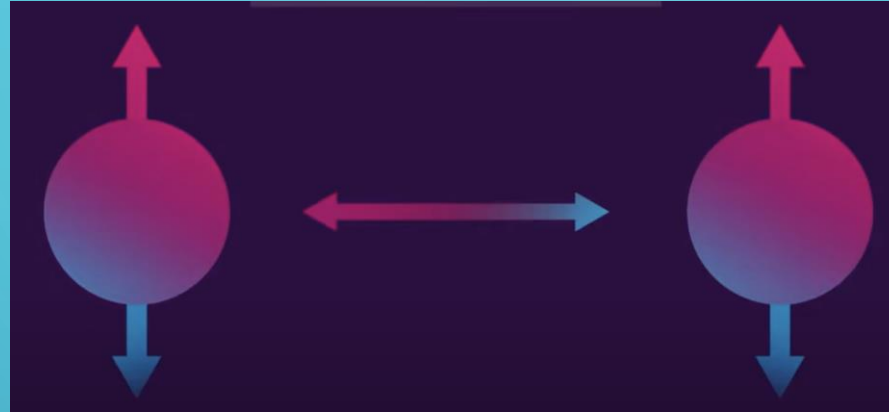


A qubit



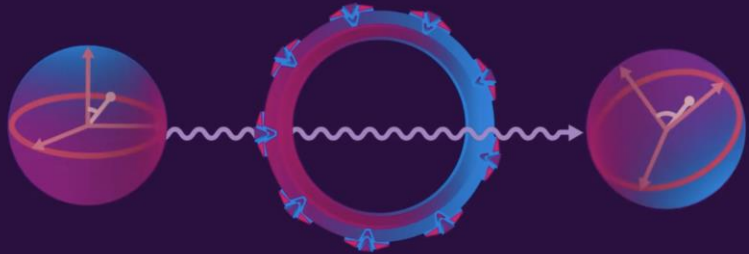
A computer consisting of n qubits can exist in a superposition of 2^n states: from $000\dots 0$ to $111\dots 1$

ENTANGLEMENT

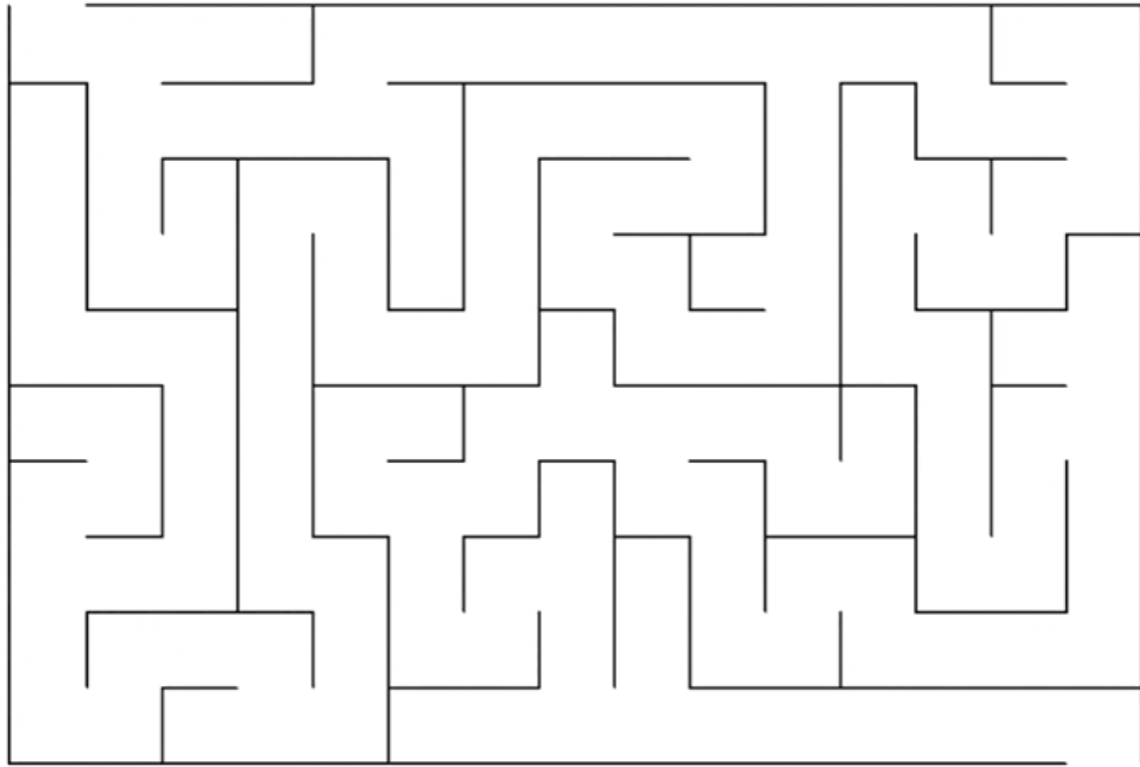


QUANTUM CIRCUIT

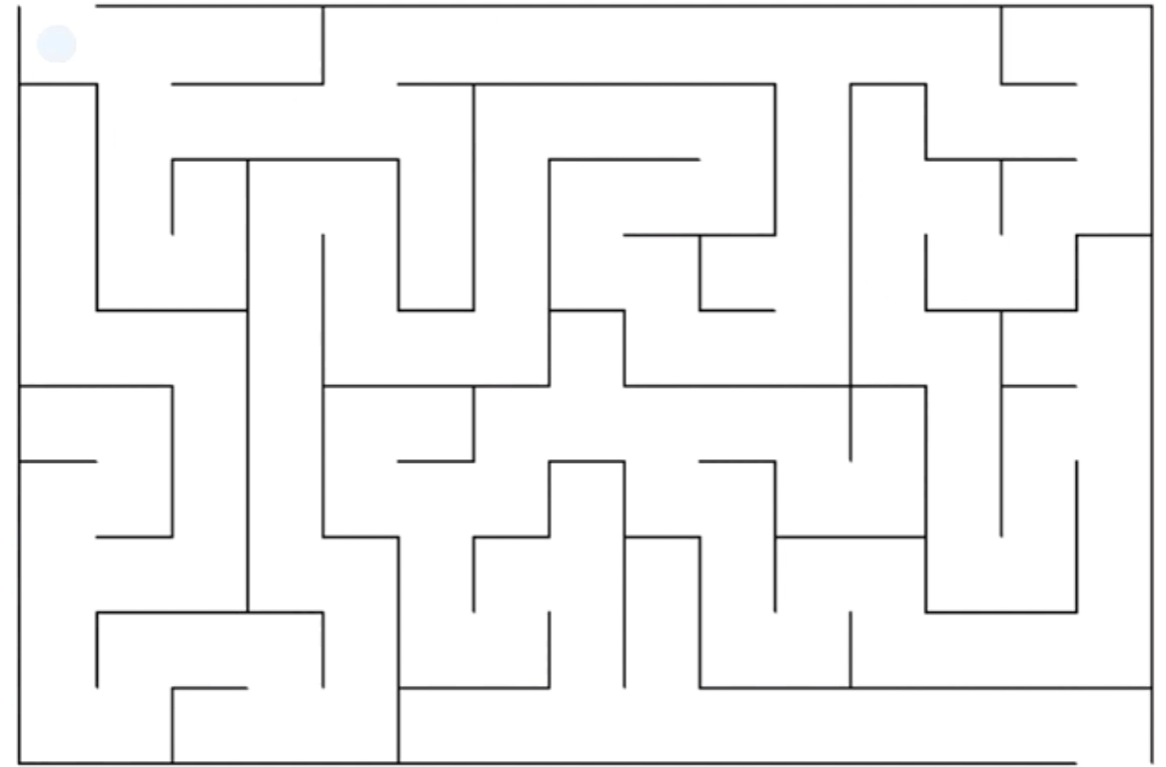
QUANTUM GATE



EXAMPLE A MAZE

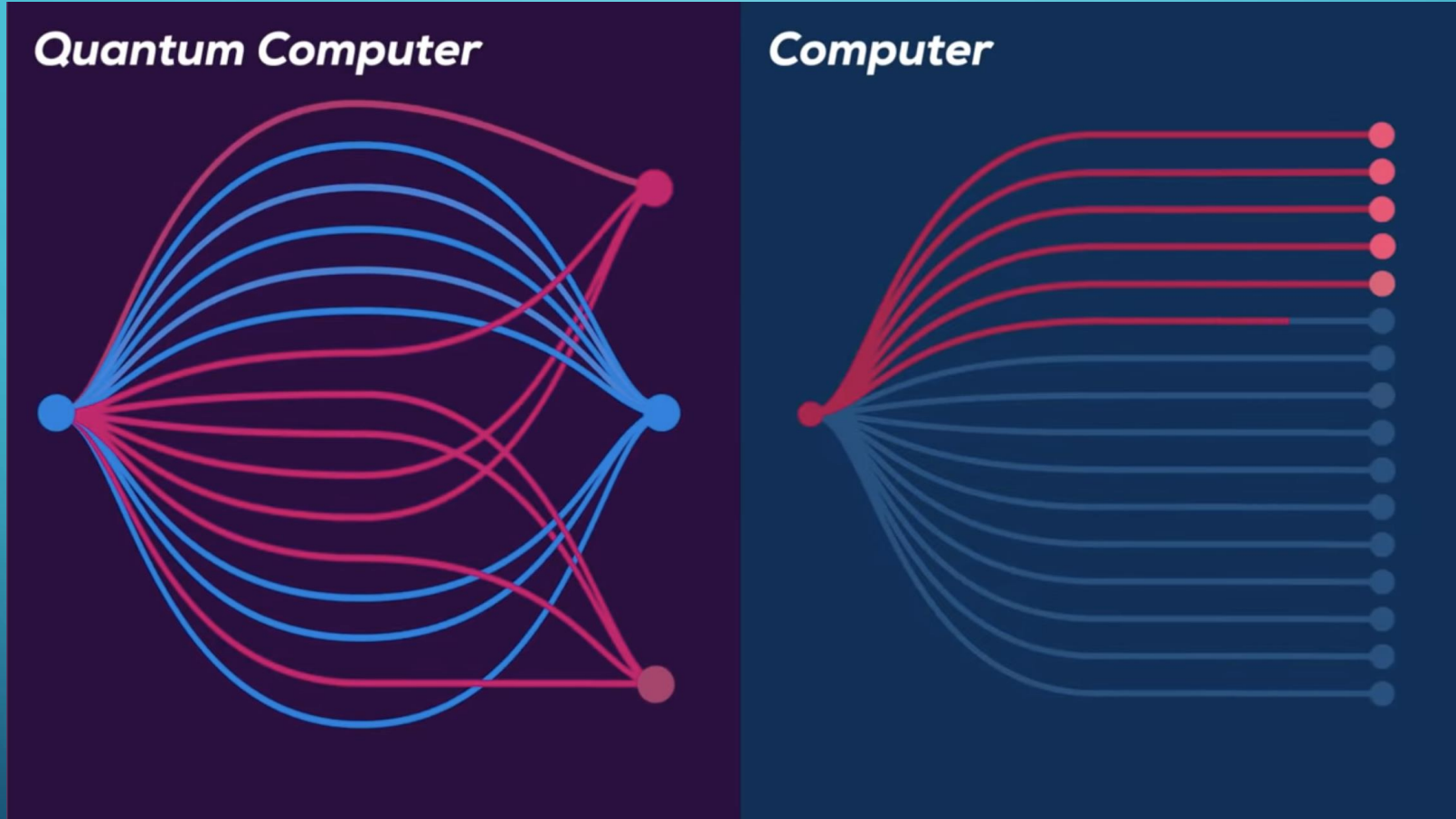


How quantum computer would solve a maze



How classical computer solves a maze

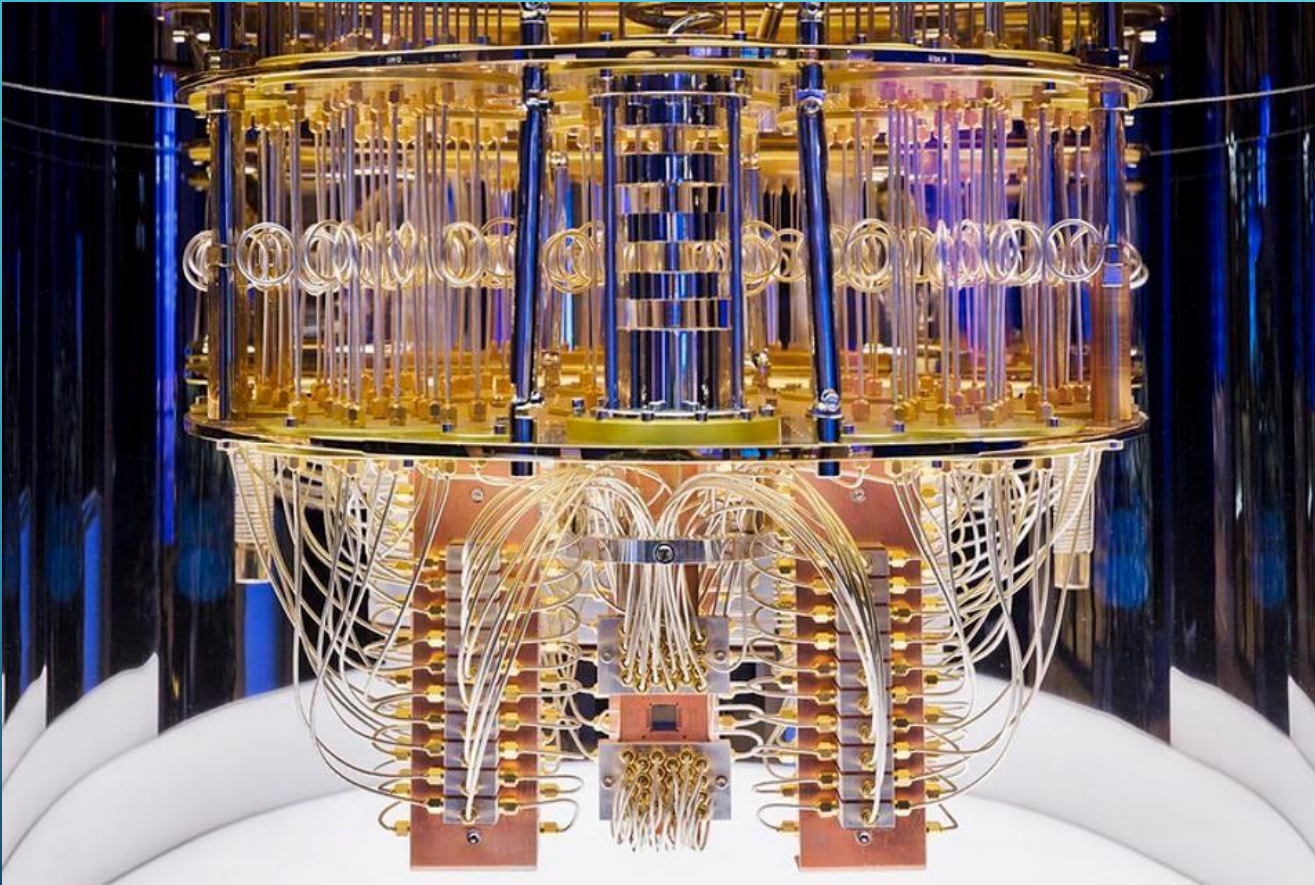
EXAMPLE A MAZE



A decorative graphic on the left side of the slide, consisting of a network of white lines and small circles on a blue gradient background, resembling a circuit board or a stylized tree structure.

LIMITS AND BENEFITS

LIMITS AND BENEFITS



- Difficult to engineer, build and program
- Faults and loss of quantum coherence
- Will not probably not replace our home computer
- Should know so much law of mathematic, physical to build


LIMITS AND BENEFITS





THANKS FOR LISTENING !

Read more :

- <https://www.ibm.com/quantum-computing/what-is-quantum-computing/>
 - <https://www.newscientist.com/question/what-is-a-quantum-computer/>
 - <https://www.youtube.com/watch?v=JhHMJCUmQ28>
 - https://en.wikipedia.org/wiki/Quantum_computing
 - <https://www.scientificamerican.com/video/how-does-a-quantum-computer-work/>
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