Big Data on your palm

Idea 1 : Quantum Computing - Managing Big Data in a palm of the hand

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Sun Bin MUN

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Why we need Quantum computing?

Along with the explosive amount of structured and non-structured data, there are needs to handle and use overflowing amount of data.
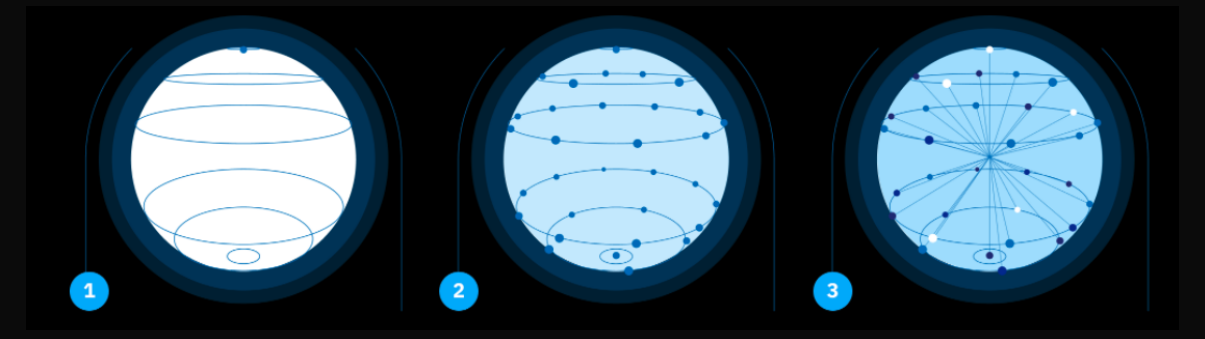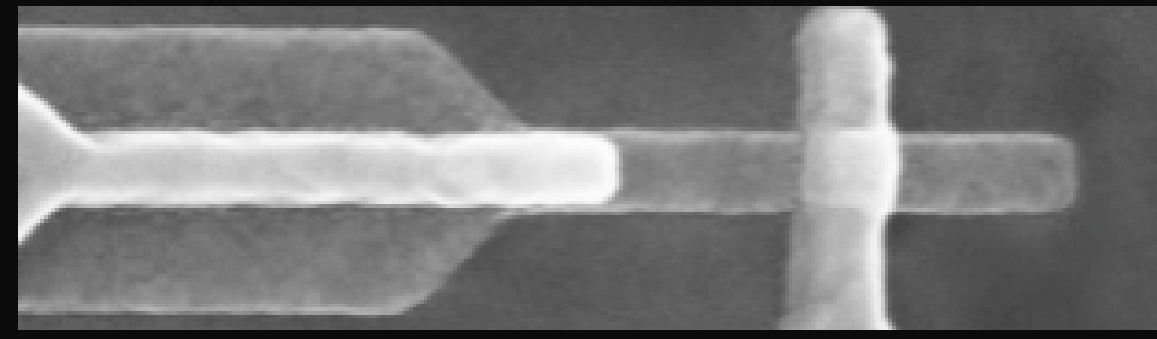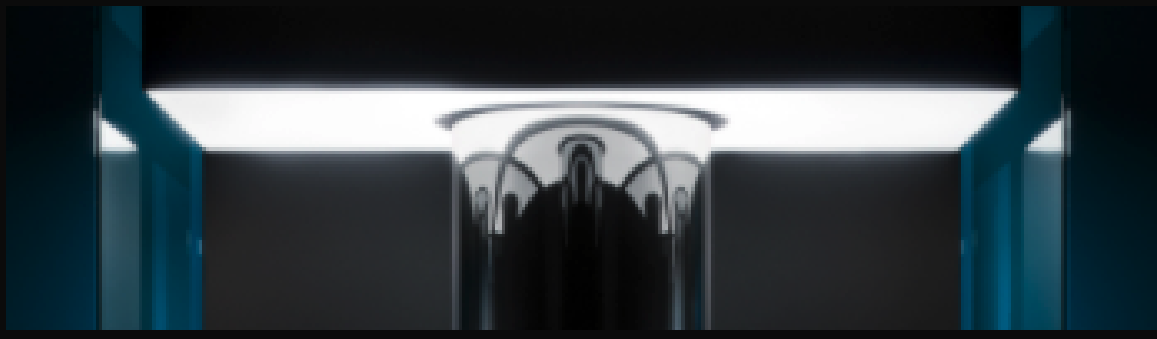
How to use?

In the next page, we will delve into actual implementation and technology behind!

"Information is the oil of the 21st century, and analytics is the combustion engine"

01. Technology

01 Super Fluid — **02** Super Conduct — **03** Property

Use the superfluid to cool down the conductor, so the conductor is almost close to the absolute zero

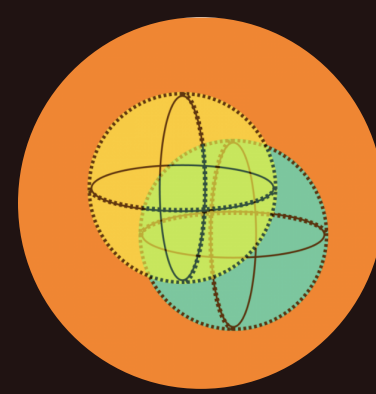Put the Cooper pair electrons (loosely bound electrons) which allow them to show quantum behavior

Enhance computational spaces with superposition, and solve complex problems are using entanglement
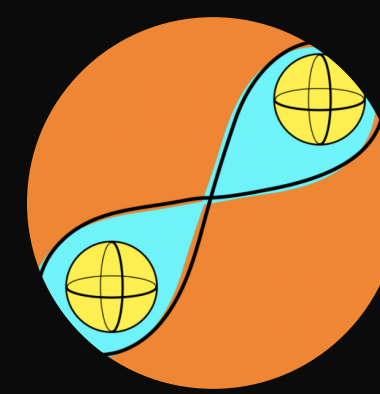
02. Implementation

Grover's Algorithm

Tasks normally taking $O(N/2)$ on average can be calculated in $O(\sqrt{n})$
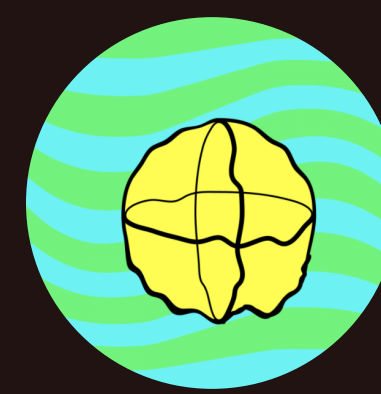
$$O(N/2) \Rightarrow O(\sqrt{n})$$

Superposition

Two quantum state can be added together to form another valid state

Entanglement

Each qubits affected by another allow exponential computation growth

Interference

Channel probability to collapses qubits into particular states

Currently, there are SDKs available in Python environment (Such as Qiskit from IBM). In the near future, scalability issue of Quantum Computer will be resolved

03. Impact & Practicality

Manage Data

- **Management**: with Big Data, Quantum computer can process, store, integrate and analyze a variety of data to deduce meaningful analysis
- **Pattern recognition**: Among numerous databases, a quantum computer can detect patterns to efficiently categorize unsorted data by patterns
- **Computation**: In requesting by query on the fly, provide a much faster operation

Deep Learning
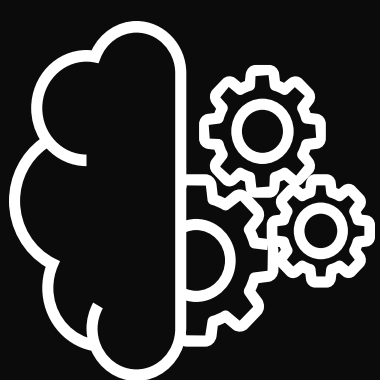
- Better **computational power** empowers training and managing Deep Learning models
- As models get "deeper" lots of computations in **optimization and feature extraction** with image/sound/text data and vectorize

Finance Modeling

- Optimizations in improving a **portfolio, algorithmic trading and market making** system
- In examining market behaviors, it is essential to handle and train data based on **Monte Carlo simulations**