bleximo

SOLVING THE HARDEST BUSINESS PROBLEMS WITH APPLICATION-SPECIFIC QUANTUM COMPUTERS

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Founder & CEO

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Incorporated in 2017

Affiliate company in Cyclotron Road incubator

Resident at Berkeley National Laboratory

Venture funded

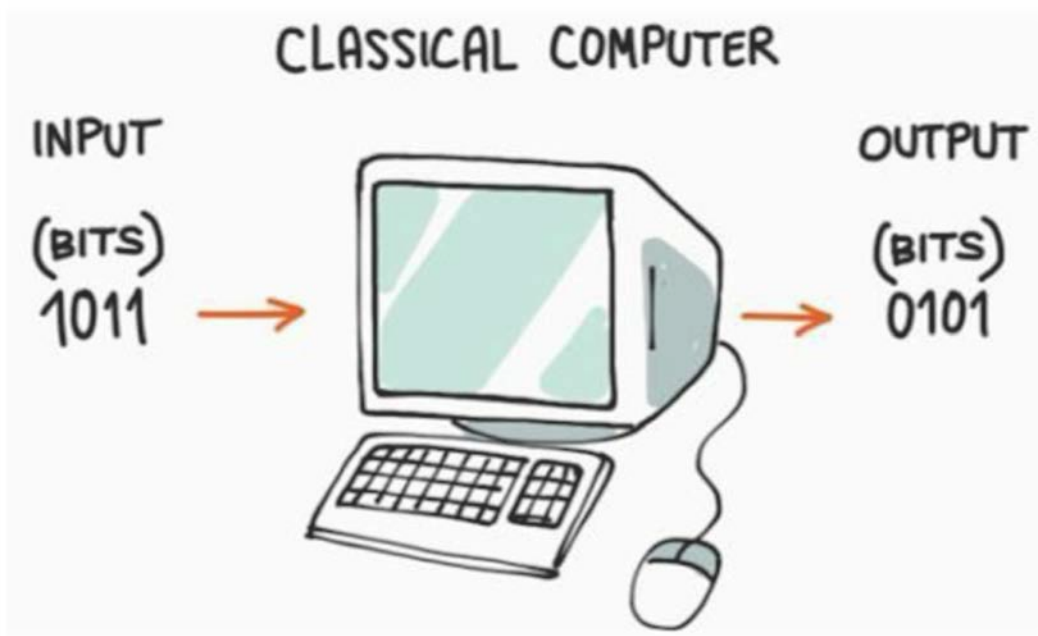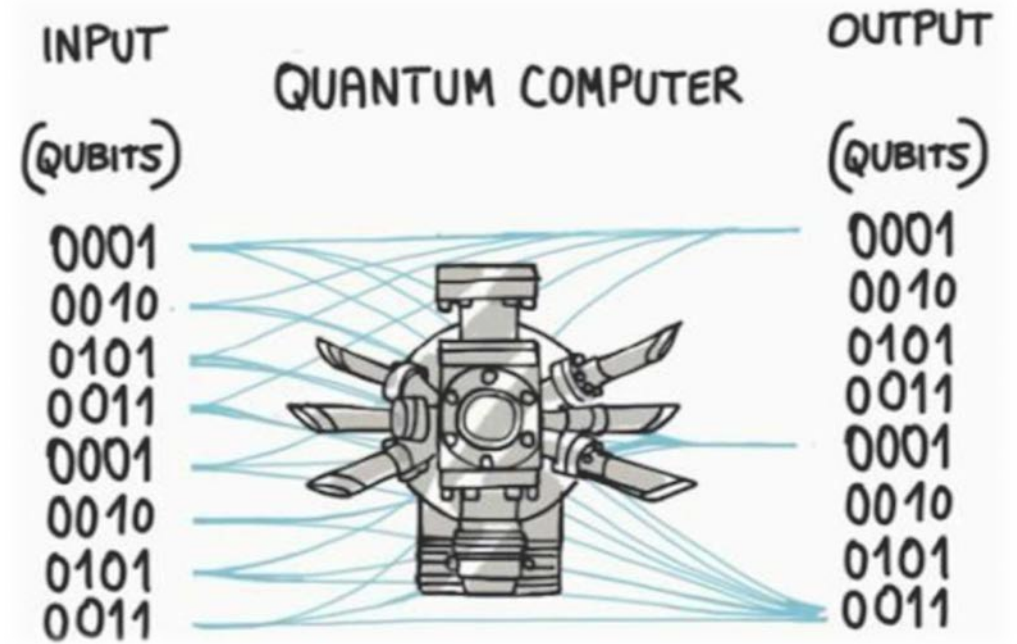Commercial and government contracts

PARTNERSHIPS

SUPPORTED BY

✓ Numerous high-value business problems are difficult, expensive, or even impossible to solve on conventional digital computers

✓ Only limited improvement from domain-specific solutions (e.g., GPUs, bitcoin mining, "artificial intelligence" chips, etc.) replacing or complementing high-performance digital computing systems

CLASSICAL COMPUTER

INPUT (BITS) 1011 → OUTPUT (BITS) 0101

INPUT (QUBITS)
0001
0010
0101
0011
0001
0010
0101
0011

QUANTUM COMPUTER

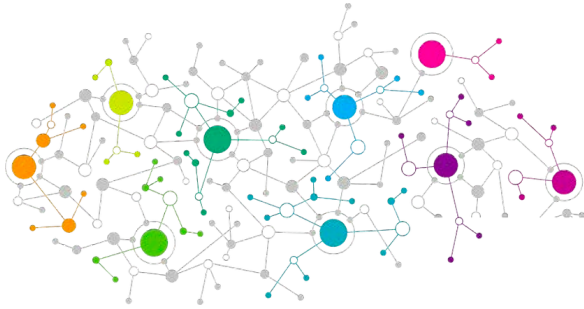OUTPUT (QUBITS)
0001
0010
0101
0011
0001
0010
0101
0011

Compute and sequentially sort all possible solutions to find the best one

All possible solutions processed **simultaneously** and the best one selected **automatically**
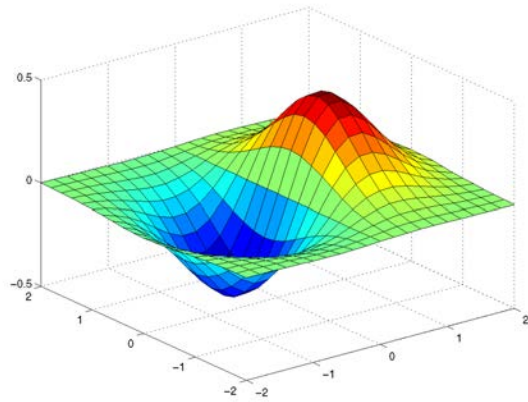
USE CASES IN NUMEROUS INDUSTRIES

TYPE OF PROBLEM

USEFUL FOR...

APPLICATIONS INCLUDE...

Combinatorial optimization

Minimizing or maximizing objective functions

- ✓ Logistics optimization (e.g., vehicle routing)
- ✓ Supply chain optimization (e.g., allocation of resources, infrastructure management)
- ✓ Scheduling/operations (e.g., staff & equipment allocation)

Differential equations

Modeling the behavior of complex systems obeying physics-like equations

- ✓ Specialty chemicals and materials development
- ✓ Dynamics simulations for aeronautical design
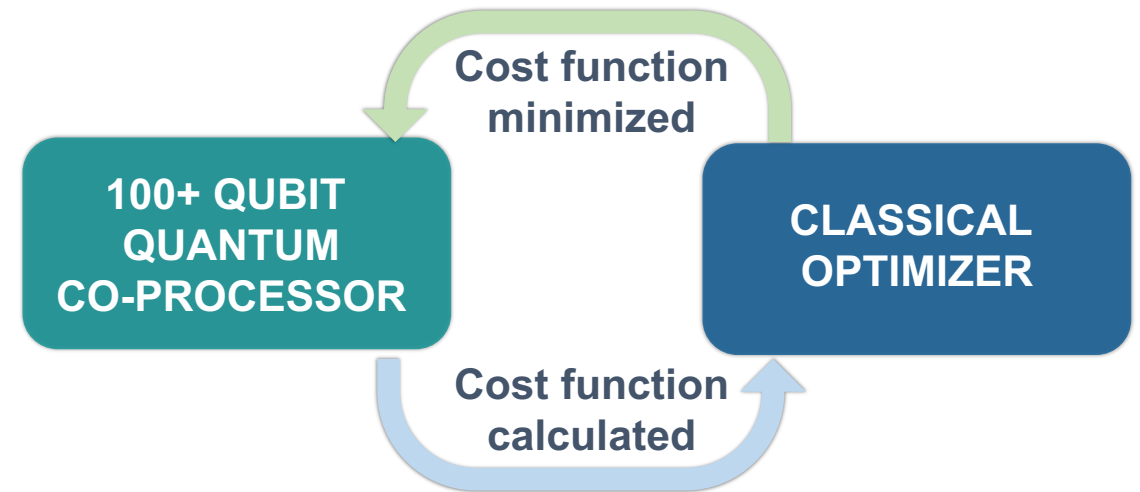- ✓ Simulations of financial and social processes
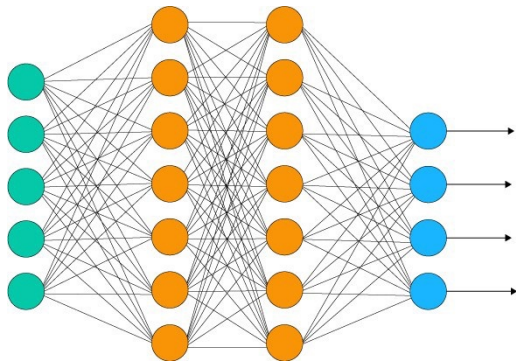
Linear algebra

Machine learning tasks, e.g., pattern matching, clustering, principal component analysis, etc.

- ✓ Strategic decision-making
- ✓ Risk management
- ✓ Operational resilience, incl. threat detection

## NOISY INTERMEDIATE-SCALE QUANTUM (NISQ) ERA

- ✓ 100+ imperfect (noisy) quantum bits

- ✓ Limited time to run calculations

- ✓ Hybrid classical/quantum systems

- ✓ Heuristic algorithms for finding "good-enough" solutions

100+ QUBIT QUANTUM CO-PROCESSOR

Cost function minimized

CLASSICAL OPTIMIZER

Cost function calculated

Which quantum computer design will yield quantum advantage in practical business applications?

LEADING PHYSICAL PLATFORMS FOR QUANTUM COMPUTING

Photons

Semiconductor Spins

Cold atoms

Trapped Ions

Superconducting Circuits
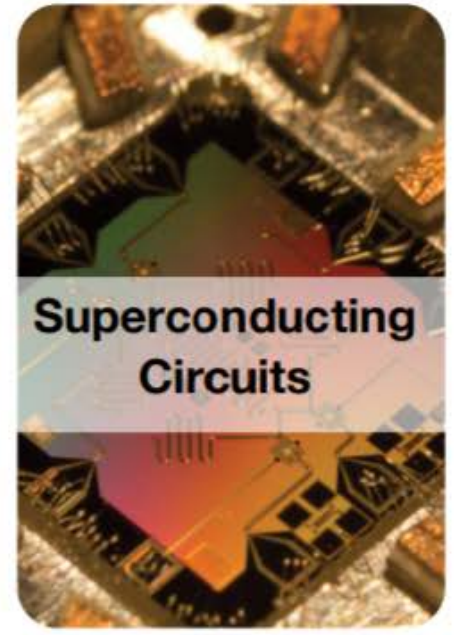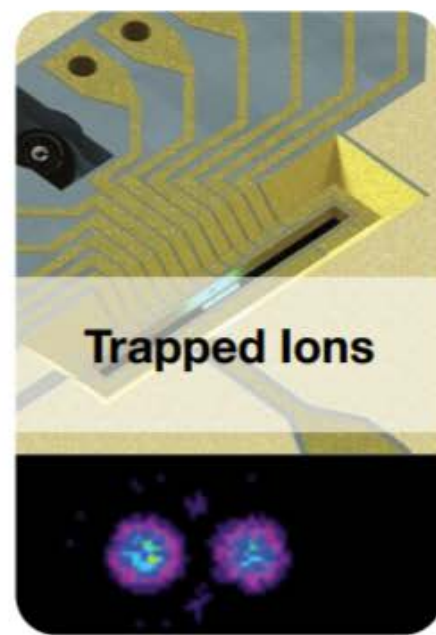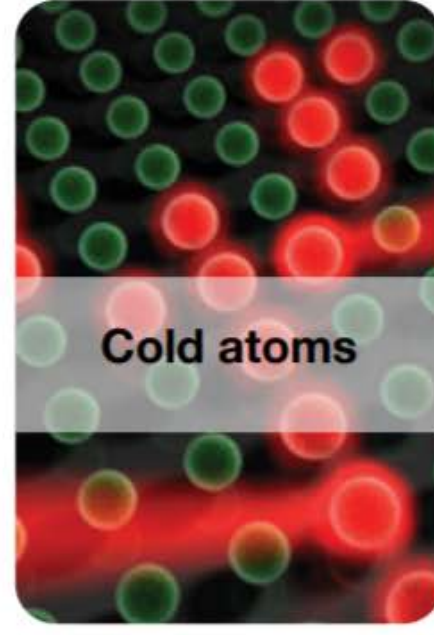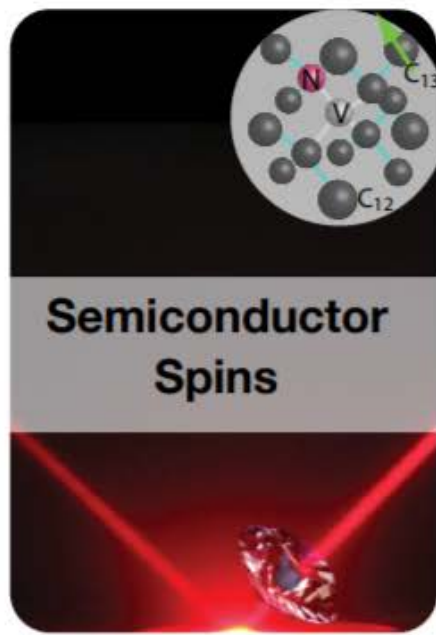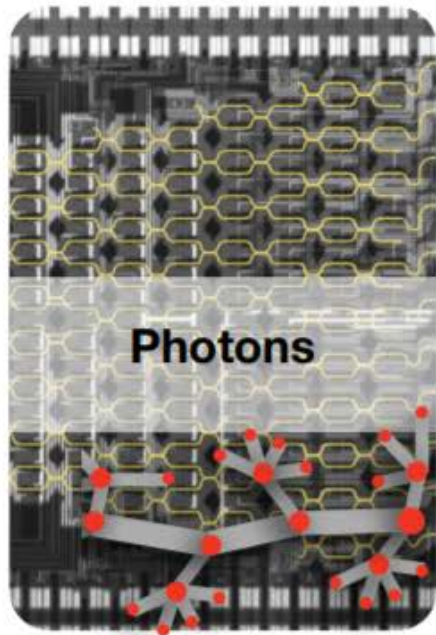
Bleximo's QUANTUM ACCELERATORS™ are full-stack gate-based superconducting NISQ computers working in conjunction with classical HPC systems

Employing application-specific superconducting quantum processors to achieve drastic performance boost in practical business applications

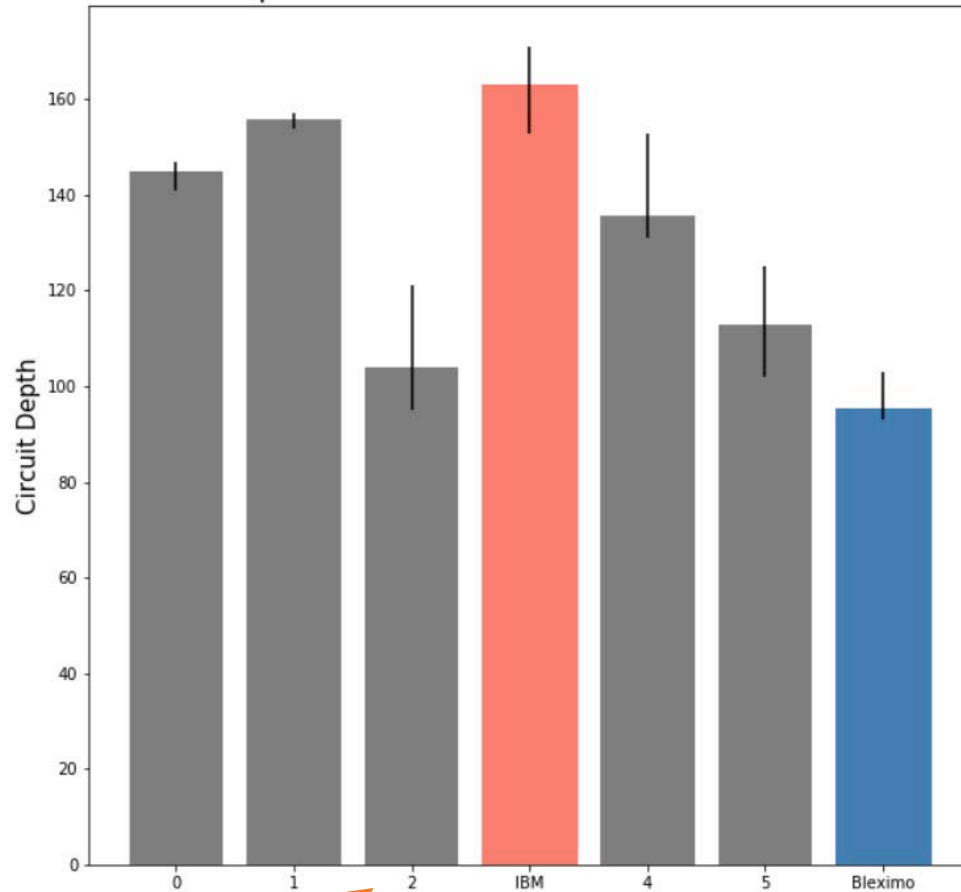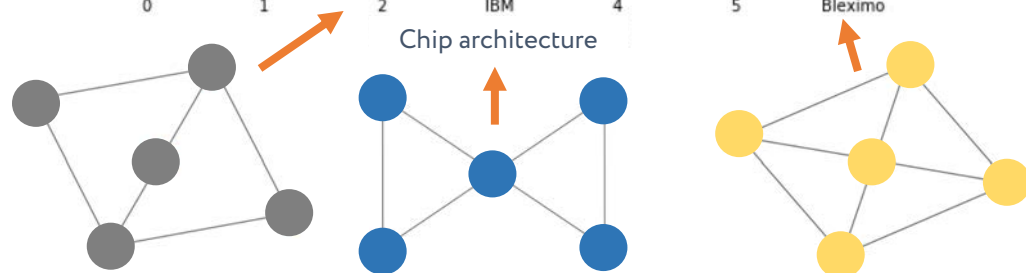## QUANTUM ALGORITHMS CONTAIN NO INFORMATION ON HOW QUBITS ARE PHYSICALLY CONNECTED

Circuit depth

ALGORITHM RUN TIME (SIMULATIONS)
~100 randomly placed one- and two- qubit gates

For the same number of qubits, algorithm runtime depends significantly on a processor architecture

Focus on optimizing performance at each step

Application → Quantum Algorithm → Application-Specific Processor → Supporting Hardware → NISQ Computer

Algorithm/software/hardware co-design yields the most efficient utilization of technology

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FIRST, ENGAGE STRATEGIC CUSTOMERS TO BUILD FIRST PRACTICAL SYSTEMS

THEN SCALE

DEFENSIBLE TECHNOLOGY PORTFOLIO CATEGORIES

Cryogenic Platform	Quantum IP	Developer Tools
■ Architecture ■ Signal delivery & conditioning ■ Chip loading/unloading & protection ■ Cloud deployment	■ Logic modules ■ Modules' interconnect ■ Processor architectures ■ SoC platform ■ Industry solutions	■ Algorithm design ■ Chip layout synthesis ■ Simulation & verification ■ Virtual and physical prototyping

THANK YOU!

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