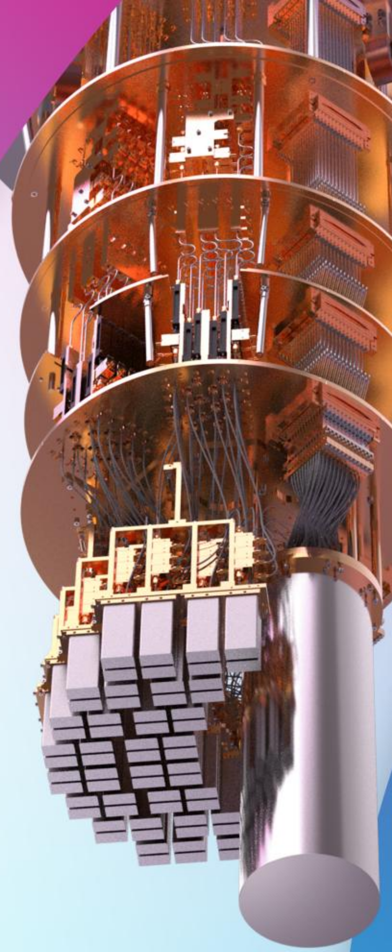
Quantum Computing

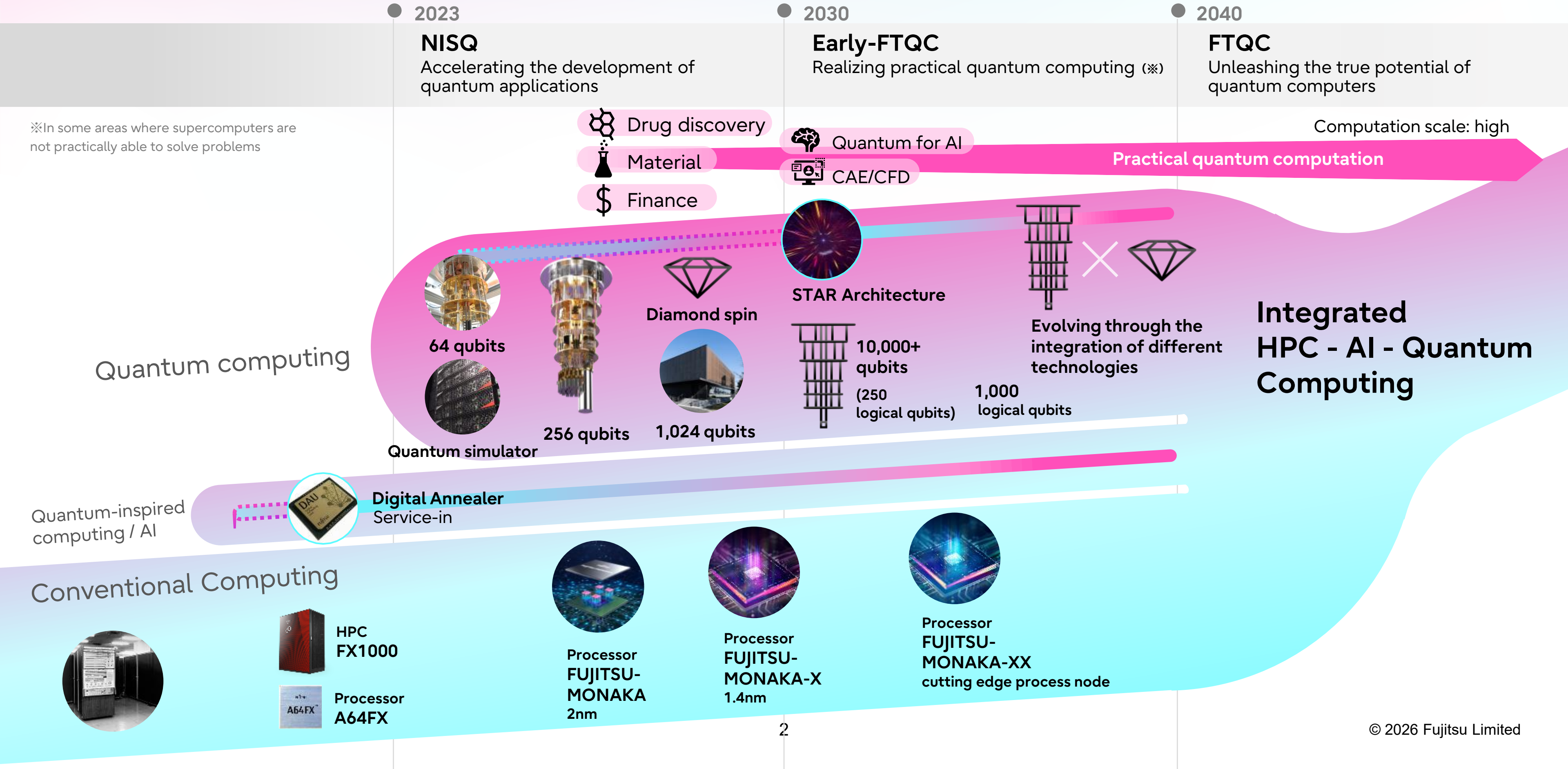


Fujitsu Limited

June, 2026

Evolution toward Next-Generation Computing

FUJITSU



Fujitsu's Strategy for Quantum Computing

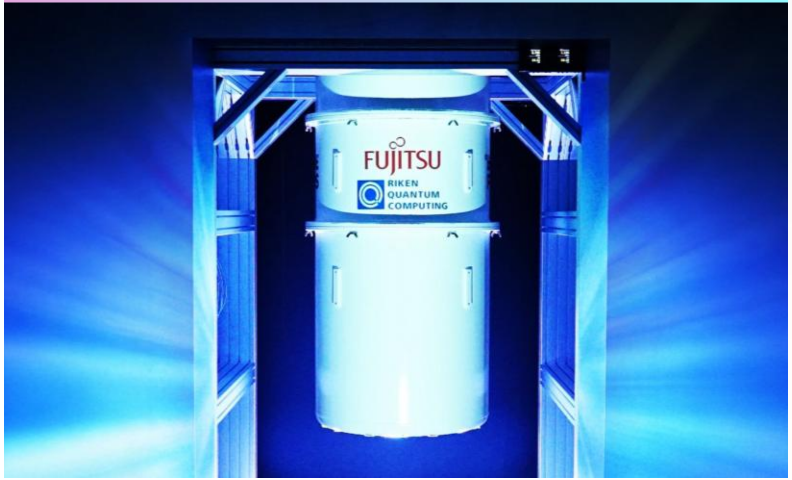
- Cover all the technology layers with the world's leading research institutions
- Put emphasis on software technologies, while working on several types of hardware
- Develop applications with end users by using Hybrid Quantum Computing Platform

Quantum Application	Research with end-user input: **Materials** | **Drug discovery** | **Finance**		**FUJIFILM, Tokyo Electron, TU Delft,** etc.
Quantum Software	Algorithm	**UC Berkeley** Quantum Error Correction	**U of Osaka** Quantum Error Correction
Quantum Platform	Complier Middleware	**U of Edinburgh** Hybrid Computing	Cloud Technology
Quantum State Control **Quantum Device & Integration**	**RIKEN** Superconducting Qubit	**TU Delft** Diamond Spin Qubit	Exploring other possibilities, Neutral Atom etc.

Launch of a 64/256-qubit Superconducting Quantum Computers

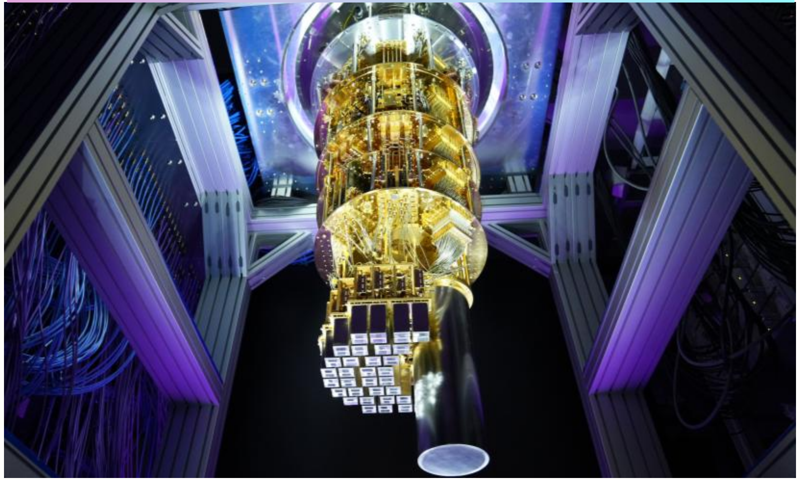
Developed at RIKEN RQC-Fujitsu Collaboration Center with Prof. Nakamura

64-qubit system Oct. 2023



https://pr.fujitsu.com/jp/news/2023/10/5.html

256-qubit system Apr. 2025



https://pr.fujitsu.com/jp/news/2025/04/22.html

Our First Commercial Quantum Computer

Delivered to G-QuAT at AIST in March 2025, as part of the ABCI-Q

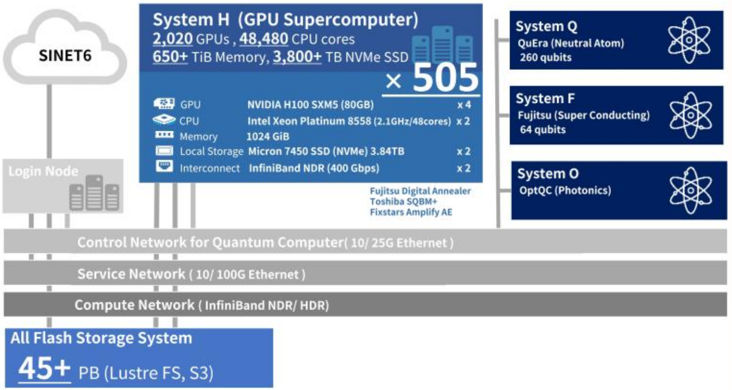
- Planned to be made available to engineers in Japan and internationally to support the social implementation of quantum technologies

ABCI-Q: A quantum classical hybrid computing infrastructure

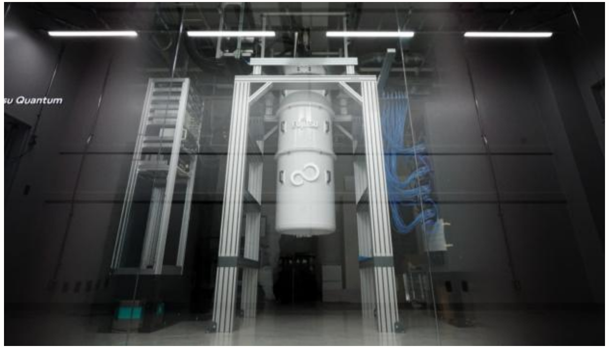
- Comprises a GPU supercomputer and multiple quantum computers of different modality
  Fujitsu provided the GPU supercomputer and a superconducting quantum computer

ABCI-Q : Quantum Classical Hybrid Computing Infrastructure

System H
GPU Supercomputer



System F
Superconducting Quantum Computer by Fujitsu



Illustration/Photo: By courtesy of G-QuAT, AIST

Fujitsu Quantum Computer Roadmap

FUJITSU

FY 2022 **2023** **2024** **2025** **2026** **2030** **2035**

March
36
-qubit
Simulator

July
40
-qubit
Simulator

October
64
-qubit
quantum computer
Developed by
RIKEN RQC – Fujitsu
Collaboration Centre

March
256
-qubit
quantum computer
Computer with
quantum-classical hybrid
applications

December
1,024
-qubit
quantum computer

10,000+
-qubit
(250 logical qubits)
quantum computer

1,000
-logical qubit
quantum computer

March
Helped RIKEN release
first Japanese domestic
quantum computer

August
Establishment of high-speed execution method of
practical algorithm using original quantum computing
technology STAR architecture

2024
64 qubit machines x
HPC hybrid computing

September 2025
Completion of
quantum building

December 2026
1,024 -qubit machine
×HPC(**FUJITSU-MONAKA**)
Hybrid computing center

2031
10,000+ -qubit machine
×HPC
(**MONAKA-X, GPU servers**)
Hybrid computing center

Industrial PoC

Materials

FujiFilm

Discover innovative materials through simulation

Precise energy calculation of organic molecules using Variational Quantum Algorithms

Drug Discovery

Mitsubishi Chemical Corporation

Realize drugs with high efficacy and low side effects

Computing energies of large molecules such as proteins

Finance

Mizuho Daiichi Financial Technology

Optimizing investment decisions

Risk assessment for portfolio optimization with Quantum Monte Carlo

Manufacturing

AGC

Effective resource utilization to reduce environmental impact

Quantum approximate optimization algorithm for glass plate cutting problems

Diamond spin qubit technology

Diamond nitrogen-vacancy (NV) center

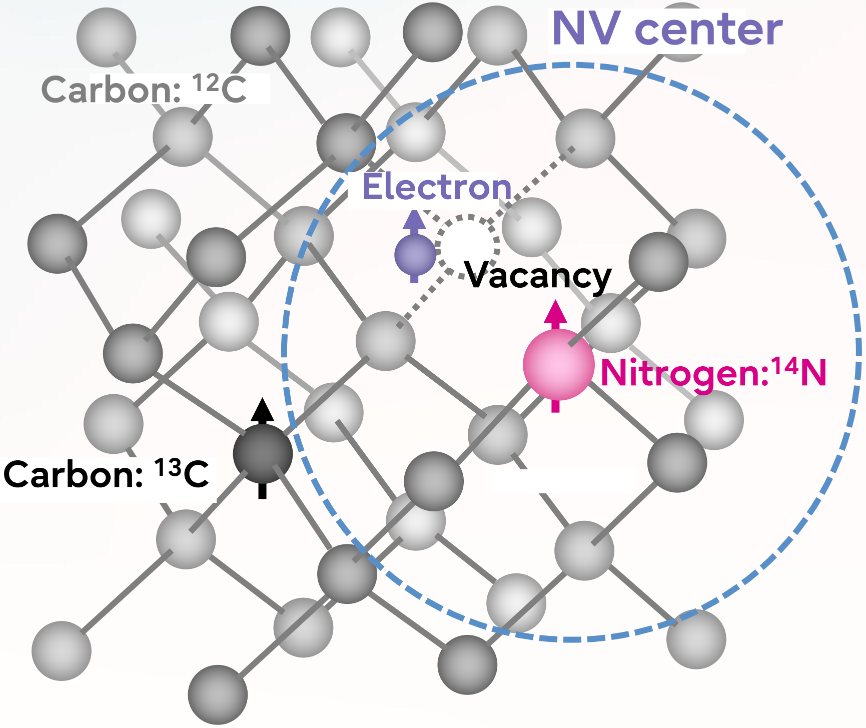
A structure in a diamond crystal where a carbon atom is substituted by a nitrogen atom at its expected lattice site, and there is a vacancy at an adjacent site.

The NV center captures one electron, becoming negatively charged, and exhibits magnetic properties.

Due to the strong bonds of the carbon atoms that constitute diamond, the spin is stable and can maintain a superposition state for a relatively long time.

Spin that can be used as a qubit

- **Electron spin around a vacancy**
- **Nuclear spin of an isotopic carbon atom: ^{13}C & ^{14}N**



Diamond-Spin Qubit Technologies for Scalable Quantum Computer

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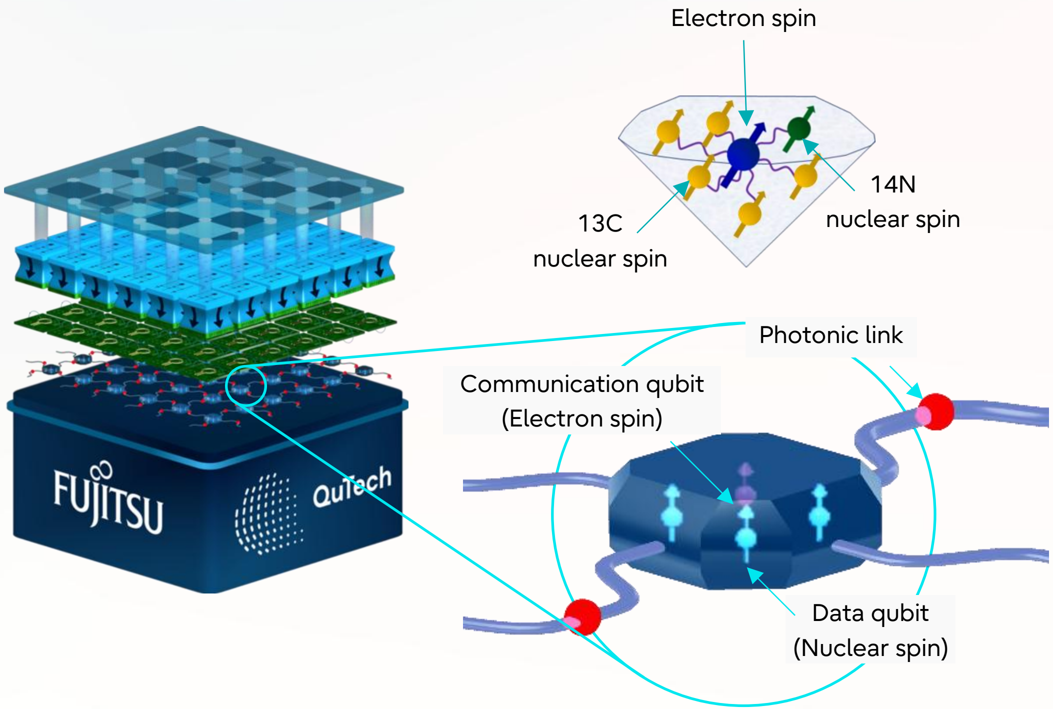
- Each quantum module consists of an electron spin and nuclear spins in a diamond.
- Quantum modules are connected by photonic links, which can be used as one quantum computing system.
- This approach can allow for high-temperature operation (> 1 K) and good scalability.



FUJITSU TUDelft QuTech

Digital Annealer

What is the Digital Annealer?

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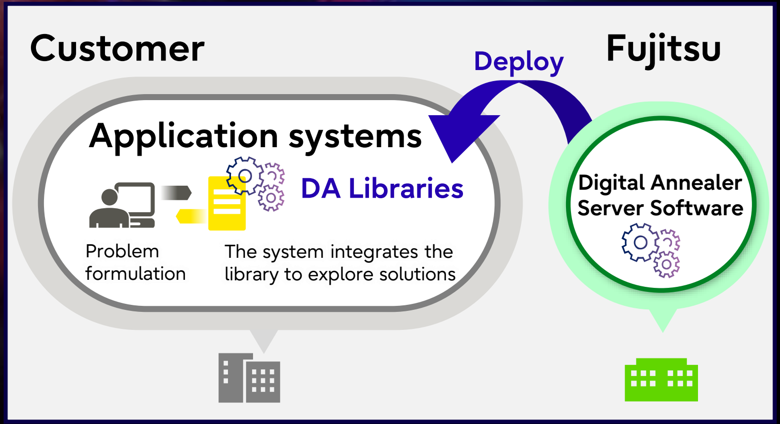
A computing technology inspired by quantum phenomena

- Quickly solves “combinatorial optimization problems” using annealing-based algorithms
- Software-based implementation enables rapid deployment in customer environments

Features

Scalability	Supports 100,000-bit problems (up to 1 million bits achieved at research level)
High Speed	Incorporates constraint-based search technology into the annealing core to accelerate solving many complex real-world problems
Practical Applications	Over 350 customer implementations

Delivery model



Digital Annealer Application Areas

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Contributing to solving various customer challenges

350+
successful projects

Drug Discovery and Materials
- Material Research (batteries, mixture)
- Medium Molecular Medicine Stable Structure Search
- Molecule Similarity Search
- Spectrum Analysis

Medical
- Radiation Therapy

Logistics and Transportation
- Logistics Network Optimization
- Traffic Volume Optimization

Manufacturing
- Manpower Planning
- Factory Traffic Flow Optimization

Finance
- Portfolio Optimization

Marketing
- Marketing

Quantum-inspired Technology Digital Annealer

FUJITSU

Continuously advancing quantum computing technologies toward the era of fault-tolerant quantum computing in 2030 and beyond

Quantum Technology

©RIKEN

Quantum-inspired Technology

Application Layer

DA Server S/W
- Software that enables on-premises DA system deployment

EvoQX S/W
- Auto-generates QUBO using Digital Annealer + ML
- Enables easy use without specialized expertise

DA for Route Planning S/W
- Software that leverages the Digital Annealer for solving vehicle routing problems (VRP)

Conversational optimization
- Chat-based tool to formulate, solve, and visualize optimization problems
- Powered by GenAI for easy interaction and use

2020-2024 | 2025 | 2026 | 2027 | 2028-2029 | 2030 -

DA Core Engine

3rd Gen in 2020
- 100k-bit support via hardware-software hybrid

4th Gen in 2022
- Large-scale annealing core
- Up to 10× faster than 3rd Gen

5th Generation
- Higher-order term support
- Quadratic inequality constraint support
- Accelerated linear problem solving

5th+ Generation
- Support for integer and real variables
- Ultra large-scale problems support

Hybrid Computing
- Combining quantum computing strengths with Digital Annealer–based optimization

*Roadmap is subject to change without notice.

Thank you