# Construction and Technical Development of a Quantum-HPC Hybrid Platform

As part of the Transformative Research Innovation Platform of RIKEN platforms (TRIP)*, R-CCS is working on technologies to explore new frontiers in computability by tightly integrating quantum computers (QCs) with high-performance computing (HPC) systems—going beyond the capabilities of current supercomputers. To accelerate this research and development, we are conducting a NEDO-funded project called JHPC-Quantum**, in collaboration with SoftBank, The University of Tokyo, and The University of Osaka. This project focuses on designing system software, programming frameworks, libraries, and applications for QC-HPC hybrid computing. Using these software, we are building and operating a hybrid computing platform that combines on-premise quantum computers with supercomputers to support QC-HPC hybrid computing research. Our scientific goal is to demonstrate the effectiveness of QC-HPC hybrid computing, and to promote internet technologies that deliver QC-HPC applications as services in the 5G era.

*This is a challenging project to create an innovative research platform that organically links the cutting-edge research platforms in each field that are the strengths of RIKEN, and creates new areas of knowledge that transcend research fields. It started in FY2023.

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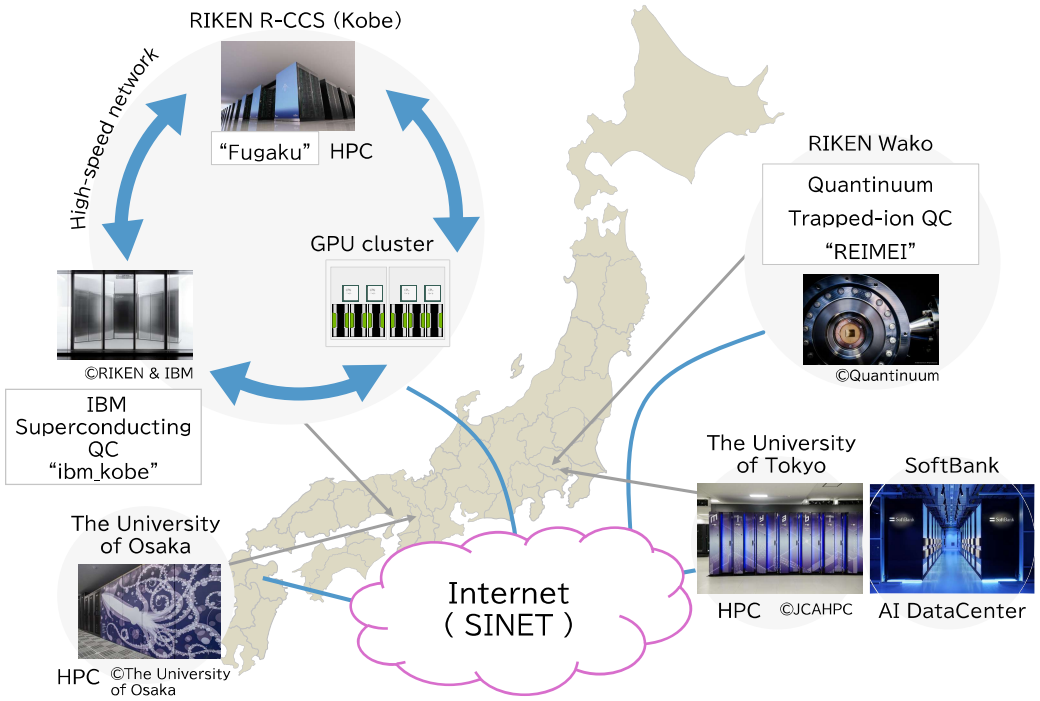


In addition to the superconducting quantum computer A at the RIKEN Wako Office, a trapped-ion quantum computer "REIMEI" from Ouantinuum has installed at the Wako Office, and a superconducting quantum computer "ibm_kobe" from IBM has installed at the Kobe Office. These quantum computers will be connected to the R-CCS Fugaku, the supercomputers at The University of Tokyo and The University of Osaka, and AI DataCenter in SoftBank. Since "ibm_kobe" is installed in the same building as 'Fugaku', it is connected via a high-speed, low-latency network.


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