Say goodbye to vendor lock-in!
Empowering users to choose quantum program transpilation and optimization software

Osaka, Japan — A research team at Osaka University and TIS Inc. has developed software "Tranqu" that allows users to select a transpiler that converts and optimizes quantum programs for execution on quantum chips. This enables users to choose a transpiler without being tied to a specific vendor, resulting in more accurate execution outcomes.

To perform computations on a quantum computer, quantum programs written by humans must be translated into a form that quantum chips can understand. The software responsible for this translation is called a "transpiler." Currently, companies and research institutions offering quantum computing cloud services (hereafter referred to as "vendors") provide vendor-specific transpilers. However, this approach presents significant challenges. Once users select a particular vendor's service, they are effectively limited to using that vendor's transpiler.

This is known as vendor lock-in. Vendor lock-in poses a serious problem. Since the performance of a quantum program depends heavily on the combination of the program itself and the transpiler used, no single transpiler is guaranteed to always be the best option. “Ideally, users should be able to freely choose the most suitable transpiler based on their objectives.” says Satoyuki Tsukano, a researcher of the team.

The team has created a new framework "Tranqu" to address the issue of vendor lock-in. Tranqu functions as an integrated framework that supports multiple quantum programming environments and enables efficient transpilation processes.

"Current quantum computers are highly prone to noise, making it crucial to select the most suitable transpiler and its parameters for quantum programs and quantum chips,” says Tsukano. “Osaka University's quantum cloud currently offers an automatic transpilation feature; however, only one transpiler is available for use. To enable the use of multiple transpilers, we have developed Tranqu.”

In addition, Tranqu is designed as a framework, allowing for the following expansions: integration of custom transpilers developed by researchers, support for new quantum program formats, and adaptation to different quantum chip architectures.

Tranqu is scheduled to be implemented in Osaka University's quantum cloud. It is expected that this will allow users to freely choose a transpiler and maximize the potential of quantum computers.

To learn more about Tranqu or to contribute to its development, please visit:

Official documentation: https://tranqu.readthedocs.io/

GitHub repository: https://github.com/oqtopus-team/tranqu

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Summary: A research team led by Osaka University has developed "Tranqu," a framework addressing vendor lock-in in quantum computing. Tranqu enables users to select from multiple transpilers, optimizing quantum program performance on various chips. It supports custom transpilers, new program formats, and diverse architectures, promoting flexibility and enhancing quantum computing’s potential.

Tweet: Say #goodbye to #vendor #lock-in! Empowering users to choose #quantum program #transpilation and #optimization software @osaka_univ_e

Primary Keyword: Applied sciences and engineering
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Computational science

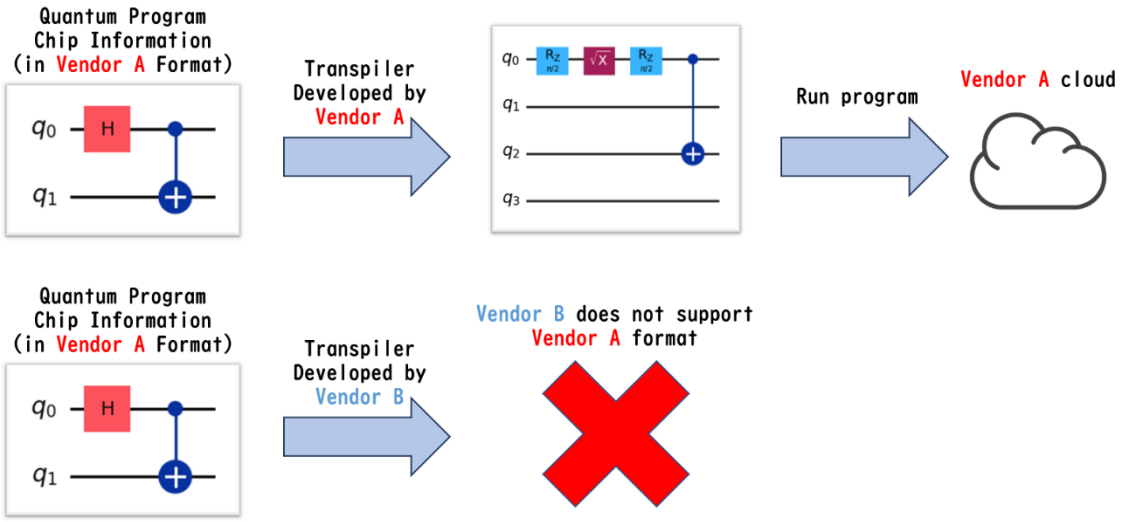

Fig. 1
You can choose a transpiler without being tied to a vendor, CC BY, Osaka University and TIS Inc.

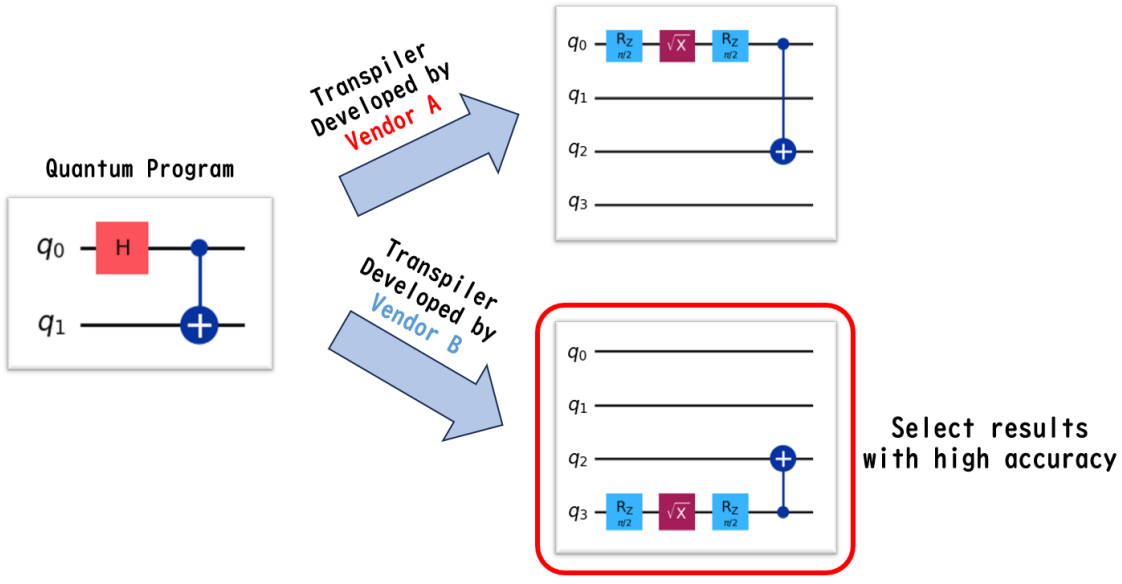

Fig. 2
Vendor lock-in of transpilers, CC BY, Osaka University and TIS Inc.

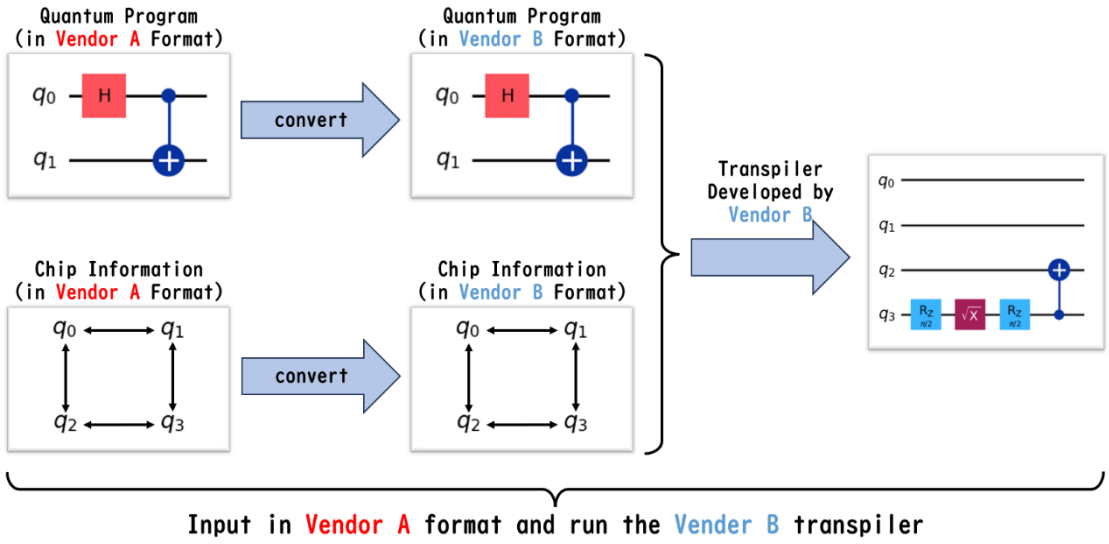

Fig. 3
How Tranqu runs transpilers, CC BY, Osaka University and TIS Inc.

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About Osaka University
Osaka University was founded in 1931 as one of the seven imperial universities of Japan and is now one of Japan's leading comprehensive universities with a broad disciplinary spectrum. This strength is coupled with a singular drive for innovation that extends throughout the scientific process, from fundamental research to the creation of applied technology with positive economic impacts. Its commitment to innovation has been recognized in Japan and around the world. Now, Osaka University is leveraging its role as a Designated National University Corporation selected by the Ministry of Education, Culture, Sports, Science and Technology to contribute to innovation for human welfare, sustainable development of society, and social transformation.
Website: https://resou.osaka-u.ac.jp/en

About TIS Inc.

TIS Inc., a member of TIS INTEC Group, is a business partner to more than 3,000 companies in various sectors, including finance, industry, public services, and distribution services. It provides IT to support growth strategies, tackling various management challenges faced by its customers. Leveraging the industry knowledge and IT development capabilities it has cultivated over more than 50 years, TIS aims to realize a prosperous society by providing IT services that have been co-created with society and customers in Japan and the ASEAN region.

Website: https://www.tis.com/