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303 S TECHNOLOGY CT
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www.quantinuum.com

Quantinuum H-Series Product Change Notification

Title of Change:	**TKET Compilation Integration into H-Series Software Stack**
Date of Change:	December 1, 2022
Contact Information:	QCSupport@quantinuum.com
Products Impacted:	System Model H1 Quantum Computers, System Model H1 Emulators, System Model H1 Syntax Checkers
Changes to Product Data Sheet:	**NO ☒ YES ☐**
Changes to Subscription Contract:	**NO ☒ YES ☐**
Changes to Interface:	**All ☐ Quantinuum API ☒ Microsoft ☐**
Description and Purpose:	The purpose of this notification is to: 1) Notify customers that TKET optimization passes have been automatically integrated into the H-Series software stack See additional information below for more details.
Reason / Motivation for Change:	TKET compilation integration to H-Series software stack
Action Required by Customers:	None

Additional Information:

1) Notification of TKET compilation integration to H-Series software stack

Effective December 1, circuits submitted to System Model H1 quantum computers (targets: H1-1, H1-2, H1), System Model H1 emulators (targets: H1-1E, H1-2E), and System Model H1 Syntax Checkers (targets: H1-1SC, H1-2SC) will be run through the TKET compilation passes for H-Series hardware. This enables circuits to be automatically optimized for H-Series systems and run more efficiently. See the TKET page for information and links to learn more about TKET.

More information about the compilation passes can be found on the pytket-quantinuum documentation page here: Default Compilation. The default compilation setting is optimization level 2. If users desire to use a different optimization level, to turn all optimizations off, or to explore what optimization passes by TKET will do before submitting, instructions for this will be found in the *Quantinuum Application Programming Interface (API) Specification* document on the user portal and in the *Circuit Submissions.ipynb* and *Circuit Submissions via pytket.ipynb* notebooks on the user portal.

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This does not impact the H-System Quantum Credits (HQCs) used since each circuit's total HQCs are calculated from the circuit as submitted by the user.

In summary, the impact to customers is as follows:

- TKET compilation passes for H-Series hardware have been integrated into the H-Series software stack
- All circuits submitted to H-Series hardware will undergo compilation via TKET before being run on hardware.
- Specifically, the default TKET compilation level will be set to optimization level 2, as described here: https://cqcl.github.io/pytket-quantinuum/api/index.html#default-compilation
- Users will have the option to use a different optimization level or turn all optimizations off.
- Users have the opportunity or to explore what optimization passes by TKET will do before submitting using pytket.

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