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**Quantum computing service platform - Part 1: Architecture and
functional requirements**

量子计算服务平台 第1部分：架构与功能要求

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document is Part 1 of GB/T 47177 "Quantum Computing Service Platforms". GB/T 47177 has already published the following parts.

1.Architecture and Functional Requirements;

2. Performance Evaluation. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed and is under the jurisdiction of the National Technical Committee on Standardization of Quantum Computing and Measurement (SAC/TC578). This document was drafted by: China Academy of Information and Communications Technology, China Mobile (Suzhou) Software Technology Co., Ltd., China National Institute of Standardization, and China Academy of Sciences. University of Science and Technology, China Telecom Quantum Information Technology Group Co., Ltd., Huayi Boao (Beijing) Quantum Technology Co., Ltd., Beijing Bose Quantum Technology Co., Ltd. Technology Co., Ltd., China Software Testing Center (Software and Integrated Circuit Promotion Center of the Ministry of Industry and Information Technology), and QuantumCTek Co., Ltd. Limited Liability Company, Hefei National Laboratory, Information Engineering University of the Chinese People's Liberation Army Cyberspace Force, Shenzhen Liangxuan Technology Co., Ltd., Beijing Jiaotong University Tongji University, Institute of Software, Chinese Academy of Sciences, China Great Wall Technology Group Corporation, Guangdong Guoteng Quantum Technology Co., Ltd., China Information Technology Group Corporation Information Security Research Institute Co., Ltd., Southeast University, Shanghai Jiao Tong University, Zhongke Kuyuan Technology (Wuhan) Co., Ltd., Shanghai Turing Intelligent Computing Quantum Technology Co., Ltd. Technology Co., Ltd., China Jiliang University, Hefei Yiwei Quantum Technology Co., Ltd., Origin Quantum Computing Technology (Hefei) Co., Ltd., Beijing Zhongke Arc Light Quantum Software Technology Co., Ltd., Jinan Quantum Technology Research Institute, Yangtze River Delta Quantum Technology Industry Innovation Center, Wuxi Photonic Chip Joint Research Center, Qingdao University, and CNPC (Beijing) Digital Intelligence Research Institute Co., Ltd. The main drafters of this document are. Zhang Meng, Yao Fei, Wang Jing, Lai Junsen, Kang Jian, Liang Futian, Liu Yong, Zhao Wending, Chen Liang, Wu Ting, Li Dongdong, and Tang Shibiao. Wu Yulin, Yao Jinyang, Huang Zhiguo, Guo Cong, Mao Zhichao, Gao Qi, Wen Kai, Ren Shuang, Gao Dingchao, Yu Chunlin, Cao Mingming, Zhou Peng, Lü Qiwen, Guo Banghong Wang Zengbin, Li Mingyue, Li He, Wang Xiaobin, Xu Yang, Jin Xianmin, Tang Hao, Tang Biao, Fu Zhuo, Shi Zhiquan, Liu Guozhen, Yang Lin, Tan Aihong, An Siguang Xu Hua, Zhao Yongjie, Dou Menghan, Fang Yuan, Ying Shenggang, Yu Jintao, Lou Huazhe, Zhou Fei, Wang Chaofan, Zheng Mingrui, Lu Lifang, Hou Yifan, Qi Xuyan Liu Fudong, Zheng Liushuai, Wei Zhimeng, Yan Yan, Yang Jian, Yu Ruiqi, Wang Han.

Limited by current technological maturity and manufacturing costs, quantum computing hardware is not yet economically and technically feasible for local deployment by individual users. Feasibility. To encourage more researchers and industry users to participate in the research and exploration of quantum computing hardware, software, algorithms, and applications, in recent years... Quantum computing service platforms have gradually become the main form of quantum computing service delivery. Users can access them by relying on classical information network infrastructure. Cloud-based quantum computing

processors allow users to submit quantum circuits or programs via network to cloud-based classical servers for compilation and distribution, ultimately achieving true quantum computing. It runs on real quantum processor hardware or a classical simulator of quantum resources, and the results are fed back to the user, forming a complete computational loop. Currently, numerous research institutions and enterprises both domestically and internationally have launched their own quantum computing service platforms, promoting quantum computing through this model. The practical application and ecosystem development of quantum computing have become an industry consensus. Formulating national standards for quantum computing service platforms and establishing a unified functional framework are crucial. This structure can promote the improvement of functions and performance of domestic quantum computing service platforms, and enhance the integration of quantum computing hardware with classical computing hardware and service platforms. Interoperability and interoperability. GB/T 47177 "Quantum Computing Service Platform" aims to specify the architecture and functional requirements of quantum computing service platforms. Requirements, technical parameters, test methods, reliability tests, inspection rules, etc., are proposed to be divided into the following two parts according to the main functional modules of the system. constitute.

1. Architecture and Functional Requirements. This section aims to clarify the architecture and functional requirements of the quantum computing service platform.

2. Performance Evaluation. This section aims to clarify the performance evaluation system, evaluation indicators, and testing methods for quantum computing service platforms.

Require. Quantum computing service platform Part

1 Scope

GB/T 47177.1-2026 is the Chinese national standard covering the platform through which a quantum computer is reached over the network - the circuit submission and compilation, the scheduling and queueing, the calibration data exposed to users and the simulators alongside the hardware. Part 1 of the series, first edition, in force since 1 September 2026, with Part 2 on performance evaluation. It was issued on 27 February 2026 and has been in force since 1 September 2026, as a first edition. The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document describes the architecture and functional requirements of the quantum computing service platform, including its service model and functional architecture. Access portal functional requirements, application service functional requirements, platform service functional requirements, infrastructure service functional requirements, and resource management functional requirements. Requirements for virtual resources, physical

resources, peripheral infrastructure, operation and management, and security. Requirements, etc. This document applies to the research, development, application, and testing of quantum computing service platforms and related fields.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 31168-2023 Information Security Technology - Security Capability Requirements for Cloud Computing Services

GB/T 37736-2019 General Requirements for Monitoring Cloud Resources in Cloud Computing, Information Technology

GB/T 42565-2023 Quantum Computing Terminology and Definitions

3 Terms and Definitions

The terms and definitions defined in GB/T 42565-2023, as well as the following terms and definitions, apply to this document.

3.1 quantum computer A physical device that performs mathematical and logical operations, stores and processes quantum information in accordance with the laws of quantum mechanics. [Source: GB/T 42565-2023, 4.10]

3.2 Gate-based quantum computer A quantum computer is a computer that uses quantum gates to perform quantum computing tasks and relies on sequences of quantum gates.

3.3 non-gate-based quantum computer A quantum computer that does not rely on a universal quantum logic gate sequence to simulate specific physical systems, quantum phenomena, or solve a specific type of problem. Computer.

3.4 A set of hardware and software components that enable on-demand provision and service delivery of quantum computing resources.

Note. Generally, it consists of quantum computer hardware resources, quantum computing services, resource management and scheduling functions, and auxiliary classical information and communication infrastructure (including computing...). It consists of computing, storage, communication networks, etc. [Source: GB/T 42565-2023, 6.1, with modifications]