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Australian STANDARD®

STANDARDS Australia

Information technology — Quantum computing — Vocabulary (ISO/IEC 4879:2024, IDT)



AS 5535:2025

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Australian Chamber of Commerce and Industry
Australian Computer Society
Australian Information Industry Association
Australian Quantum Alliance/Tech Council of Australia
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This page explains the meaning of the language and structure of this Standard.

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Australian and Australian/New Zealand Standards are voluntary unless they are referenced in legislation or called up in contracts.

Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

(a) "should" means that something is recommended.

(b) "may" means that something is permitted.

(c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Standards Australia Committee QT-001, Quantum Technologies.

The objective of this document is to define terms commonly used in the field of quantum computing. This document is applicable to all types of organizations (e.g. commercial enterprises, government agencies, not-for-profit organizations) for the purposes of exchanging quantum computing concepts.

This document is identical to and has been reproduced from ISO/IEC 4879:2024, *Information technology — Quantum computing — Vocabulary.*

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The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

For most of computing history, the foundational hardware technology has been binary digital transistor logic. In such digital systems, data and programs represented as binary classical digits (bits) are encoded into physical transistors that have and can switch between two definite internal states: on and off. The field of quantum computing introduces a new approach to the underlying computing hardware by shifting from classical logic ("on" or "off") to a quantum logic where the "quantum bits" or "qubits" (the simplest units of quantum information) are encoded into physical registers that exhibit quantum-mechanical phenomena such as superposition and entanglement.

This shift from the classical digital representation found in today's conventional computers to a quantum digital representation in tomorrow's computers is expected to bring increases in computing power and new, innovative software applications, allowing us to tackle more complex computational problems and carry out powerful analysis of more complex data patterns that are already challenging or impossible for today's technology. Quantum computing holds the potential to revolutionize fields from chemistry and logistics to finance and physics.

However, the increase in power and capability that quantum computing will provide, will also pose an important security threat once quantum computers become large enough (or cryptographically relevant, as it is sometimes described). As strong as today's cryptographic mechanisms have been against conventional computers, almost all cryptographic protocols used are vulnerable to quantum-computing-based attacks with known algorithms. This widely known risk associated with the power of quantum computing is very concerning for governments, institutions and individuals whose encrypted data are safe today, but may become decryptable once quantum computers reach large enough size.

This document aims to assist in the understanding of quantum computing concepts and the exchange of information.

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Information technology — Quantum computing — Vocabulary (ISO/IEC 4879:2024, IDT)

1 Scope

This document defines terms commonly used in the field of quantum computing. This document is applicable to all types of organizations (e.g. commercial enterprises, government agencies, not-for-profit organizations) to exchange quantum computing concepts.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Background

3.1.1
model
physical, mathematical, or otherwise appropriate representation of a system, entity, phenomenon, process or data

[SOURCE: ISO/IEC 22989:2022, 3.1.23, logical has been changed to appropriate]

3.1.2
model parameter
internal variable of a *model* (*3.1.1*) that affects how it computes its outputs

[SOURCE: ISO/IEC 22989:2022, 3.3.8]

3.1.3
machine learning
process of optimizing *model parameters* (*3.1.2*) through computational techniques, such that the model's behaviour reflects the data or experience

[SOURCE: ISO/IEC 22989:2022, 3.3.5]

3.1.4
simulator
device, computer program, or system that behaves or operates like a given system when provided a set of controlled inputs

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3750]

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