International Standard

ISO/IEC 4879

Information technology — Quantum computing — Vocabulary

Technologies de l'information — Informatique quantique — Vocabulaire

First edition
2024-05

Reference number
ISO/IEC 4879:2024(en)

© ISO/IEC 2024

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

© ISO/IEC 2024 – All rights reserved

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).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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.

© ISO/IEC 2024 – All rights reserved

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.

© ISO/IEC 2024 – All rights reserved

Information technology — Quantum computing — Vocabulary

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.

© ISO/IEC 2024 – All rights reserved