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**Software and systems engineering —  
Software testing —**

**Part 1:  
Concepts and definitions**

*Ingénierie du logiciel et des systèmes — Essais du logiciel —  
Partie 1: Concepts et définitions*



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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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the IEEE does not independently evaluate, test, or verify the accuracy of any of the information contained in its standards.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of ISO/IEC JTC 1 is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is called to the possibility that implementation of this standard may require the use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. ISO/IEEE is not responsible for identifying essential patents or patent claims for which a license may be required, for conducting inquiries into the legal validity or scope of patents or patent claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance or a Patent Statement and Licensing Declaration Form, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from ISO or the IEEE Standards Association.

ISO/IEC/IEEE 29119-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*, in cooperation with the Software & Systems Engineering Standards Committee of the IEEE Computer Society, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

ISO/IEC/IEEE 29119 consists of the following standards, under the general title *Software and systems engineering — Software testing*:

- *Part 1: Concepts and definitions*
- *Part 2: Test processes*
- *Part 3: Test documentation*
- *Part 4: Test techniques*

## Introduction

The purpose of the ISO/IEC/IEEE 29119 series of software testing standards is to define an internationally-agreed set of standards for software testing that can be used by any organization when performing any form of software testing.

It is recognized that there are many different types of software, software organizations, and methodologies. Software domains include information technology (IT), personal computers (PC), embedded, mobile, and scientific and many other classifications. Software organizations range from small to large, co-located to world-wide, and commercial to public service-oriented. Software methodologies include object-oriented, traditional, data driven and agile. These and other factors influence software testing. This series of international standards can support testing in many different contexts.

This part of ISO/IEC/IEEE 29119 facilitates the use of the other ISO/IEC/IEEE 29119 Software Testing standards by introducing the vocabulary on which this series of international standards are built and provides examples of their application in practice. Part 1 is informative providing definitions, a description of the concepts of software testing and ways to apply the software testing process defined in this part of ISO/IEC/IEEE 29119 and guidance for the other parts.

Initially, general software testing concepts are discussed. The role of software testing in an organizational and project context is described. Software testing in a generic software life cycle is explained, introducing the way software test processes and sub-processes may be established for specific test items or with specific test objectives. It describes how software testing fits into different life cycle models. The use of different practices in test planning is demonstrated; as well as how automation can be used to support testing. The involvement of testing in defect management is also discussed. Annex A describes the role of testing within the larger scope of verification and validation. Annex B provides a brief introduction to metrics used to monitor and control testing. Annex C contains a set of examples showing how to apply the standard in different life cycle models. Annex D provides examples on detailed test sub-processes. Annex E provides additional information on the roles and responsibilities typically encountered in test groups and tester independence. Finally, the Bibliography is at the end of the document.

Note that Title Case is used throughout this part of ISO/IEC/IEEE 29119 to denote processes and documents that are specified in ISO/IEC/IEEE 29119-2 and ISO/IEC/IEEE 29119-3 (e.g. Test Planning Process, Test Plan), whereas lowercase letters are used for documents that form parts of other documents (e.g. the project test strategy is an element of the Project Test Plan).

The test process model that the ISO/IEC/IEEE 29119 series of software testing standards are based on is defined in detail in ISO/IEC/IEEE 29119-2 Test Processes. ISO/IEC/IEEE 29119-2 covers the software testing processes at the organizational level, test management level and for dynamic test levels. Testing is the primary approach to risk treatment in software development. This standard defines a risk-based approach to testing. Risk-based testing is a recommended approach to strategizing and managing testing that allows testing to be prioritized and focused.

Templates and examples of test documentation that are produced during the testing process are defined in ISO/IEC/IEEE 29119-3 Test Documentation. Software testing techniques that can be used during testing are defined in ISO/IEC/IEEE 29119-4 Test Techniques.

Together, this series of international standards aims to provide stakeholders with the ability to manage and perform software testing in any organization.

# Software and systems engineering — Software testing —

## Part 1: Concepts and definitions

### 1 Scope

This part of ISO/IEC/IEEE 29119 specifies definitions and concepts in software testing. It provides definitions of testing terms and discussion of concepts key to the understanding of the ISO/IEC/IEEE 29119 series of software testing international standards.

### 2 Conformance

ISO/IEC/IEEE 29119-1 is informative and no conformance with it is required.

The ISO/IEC/IEEE 29119 software testing series of standards contain three standards where conformance may be claimed:

- test processes;
- test documentation;
- test techniques.

Conformance is addressed in ISO/IEC/IEEE 29119-2, ISO/IEC/IEEE 29119-3 and ISO/IEC/IEEE 29119-4.

### 3 Normative references

This document does not require the use of any normative references. Standards useful for the implementation and interpretation of this part of ISO/IEC/IEEE 29119 are listed in the Bibliography.

### 4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC/IEEE 24765 and the following apply.

**NOTE** The following terms and definitions are provided to assist with the understanding and readability of parts 1, 2, 3 and 4 of the ISO/IEC/IEEE 29119 Software Testing standards so some terms defined in ISO/IEC/IEEE 29119-1 will not be used in ISO/IEC/IEEE 29119-1 and will only be used in another standard in the ISO/IEC/IEEE 29119 series. Only terms critical to the understanding of these standards are included; this clause is not intended to provide a complete list of testing terms. The systems and software engineering Vocabulary ISO/IEC/IEEE 24765 should be referenced for terms not defined in this clause. This source is available at the following web site: <http://www.computer.org/sevocab>.

#### 4.1

##### **accessibility testing**

type of usability testing used to measure the degree to which a test item can be operated by users with the widest possible range of characteristics and capabilities

#### 4.2

##### **actual results**

set of behaviours or conditions of a test item, or set of conditions of associated data or the test environment, observed as a result of test execution

EXAMPLE      Outputs to hardware, changes to data, reports, and communication messages sent.

#### 4.3

##### **backup and recovery testing**

type of reliability testing that measures the degree to which system state can be restored from backup within specified parameters of time, cost, completeness, and accuracy in the event of failure

#### 4.4

##### **black-box testing**

see specification-based testing (4.39)

#### 4.5

##### **capacity testing**

type of performance efficiency testing conducted to evaluate the level at which increasing load (of users, transactions, data storage, etc.) compromises a test item's ability to sustain required performance

#### 4.6

##### **compatibility testing**

type of testing that measures the degree to which a test item can function satisfactorily alongside other independent products in a shared environment (co-existence), and where necessary, exchanges information with other systems or components (interoperability)

#### 4.7

##### **coverage item**

see test coverage item (4.54)

#### 4.8

##### **decision**

types of statements in which a choice between two or more possible outcomes controls which set of actions will result

Note 1 to entry: Typical decisions are simple selections (e.g. if-then-else), to decide when to exit loops (e.g. while-loop), and in case (switch) statements (e.g. case-1-2-3-...-N).

#### 4.9

##### **dynamic testing**

testing that requires the execution of the test item

#### 4.10

##### **endurance testing**

type of performance efficiency testing conducted to evaluate whether a test item can sustain a required load continuously for a specified period of time