INTERNATIONAL STANDARD

ISO/IEC/ IEEE 29119-4

First edition
2015-12-01

Software and systems engineering — Software testing —

Part 4: Test techniques

Ingénierie du logiciel et des systèmes — Essais du logiciel —

Partie 4: Techniques d'essai

Reference number
ISO/IEC/IEEE 29119-4:2015(E)

ISO copyright office
Ch. de Blandonnet 8 · CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
copyright@iso.org
www.iso.org

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
E-mail inmail@iec.ch
Web www.iec.ch

Institute of Electrical and Electronics Engineers, Inc. 3
Park Avenue, New York
NY 10016-5997, USA
E-mail stds.ipr@ieee.org
Web www.ieee.org

Published in Switzerland

Contents

Page

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.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 7, *Software and Systems Engineering*.

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*

The following parts are under preparation:

— *Part 5: Keyword-driven testing*

Introduction

The purpose of this part of ISO/IEC/IEEE 29119 is to provide an International Standard that defines software test design techniques (also known as test case design techniques or test methods) that can be used within the test design and implementation process that is defined in ISO/IEC/IEEE 29119-2. This part of ISO/IEC/IEEE 29119 does not prescribe a process for test design and implementation; instead, it describes a set of techniques that can be used within ISO/IEC/IEEE 29119-2. The intent is to describe a series of techniques that have wide acceptance in the software testing industry.

The test design techniques presented in this part of ISO/IEC/IEEE 29119 can be used to derive test cases that, when executed, generate evidence that test item requirements have been met and/or that defects are present in a test item (i.e. that requirements have not been met). Risk-based testing could be used to determine the set of techniques that are applicable in specific situations (risk-based testing is covered in ISO/IEC/IEEE 29119-1 and ISO/IEC/IEEE 29119-2).

NOTE A "test item" is a work product that is being tested (see ISO/IEC/IEEE 29119-1).

EXAMPLE 1 "Test items" include systems, software items, objects, classes, requirements documents, design specifications, and user guides.

Each technique follows the test design and implementation process that is defined in ISO/IEC/IEEE 29119-2 and shown in Figure 1.

Of the activities in this process, ISO/IEC/IEEE 29119-4 provides guidance on how to implement the following activities in detail for each technique that is described:

— Derive Test Conditions (TD2);

— Derive Test Coverage Items (TD3);

— Derive Test Cases (TD4).

A test condition is a testable aspect of a test item, such as a function, transaction, feature, quality attribute, or structural element identified as a basis for testing. This determination can be achieved by agreeing with stakeholders which attributes are to be tested or by applying one or more test design techniques.

EXAMPLE 2 If a test completion criterion for state transition testing was identified that required coverage of all states then the test conditions could be the states the test item can be in. Other examples of test conditions are equivalence classes and boundaries between them.

Test coverage items are attributes of each test condition that can be covered during testing. A single test condition may be the basis for one or more test coverage items.

EXAMPLE 3 If a specific boundary is identified as a test condition, then the corresponding test coverage items could be the boundary itself and immediately either side of the boundary.

A test case is a set of preconditions, inputs (including actions, where applicable), and expected results, developed to determine whether or not the covered part of the test item has been implemented correctly.

Specific (normative) guidance on how to implement the other activities in the test design & implementation process of ISO/IEC/IEEE 29119-2, including activities TD1 (Identify Feature Sets), TD5 (Assemble Test Sets), and TD6 (Derive Test Procedures), is not included in Clauses 5 or 6 of this part of ISO/IEC/IEEE 29119 because the process is the same for all techniques.

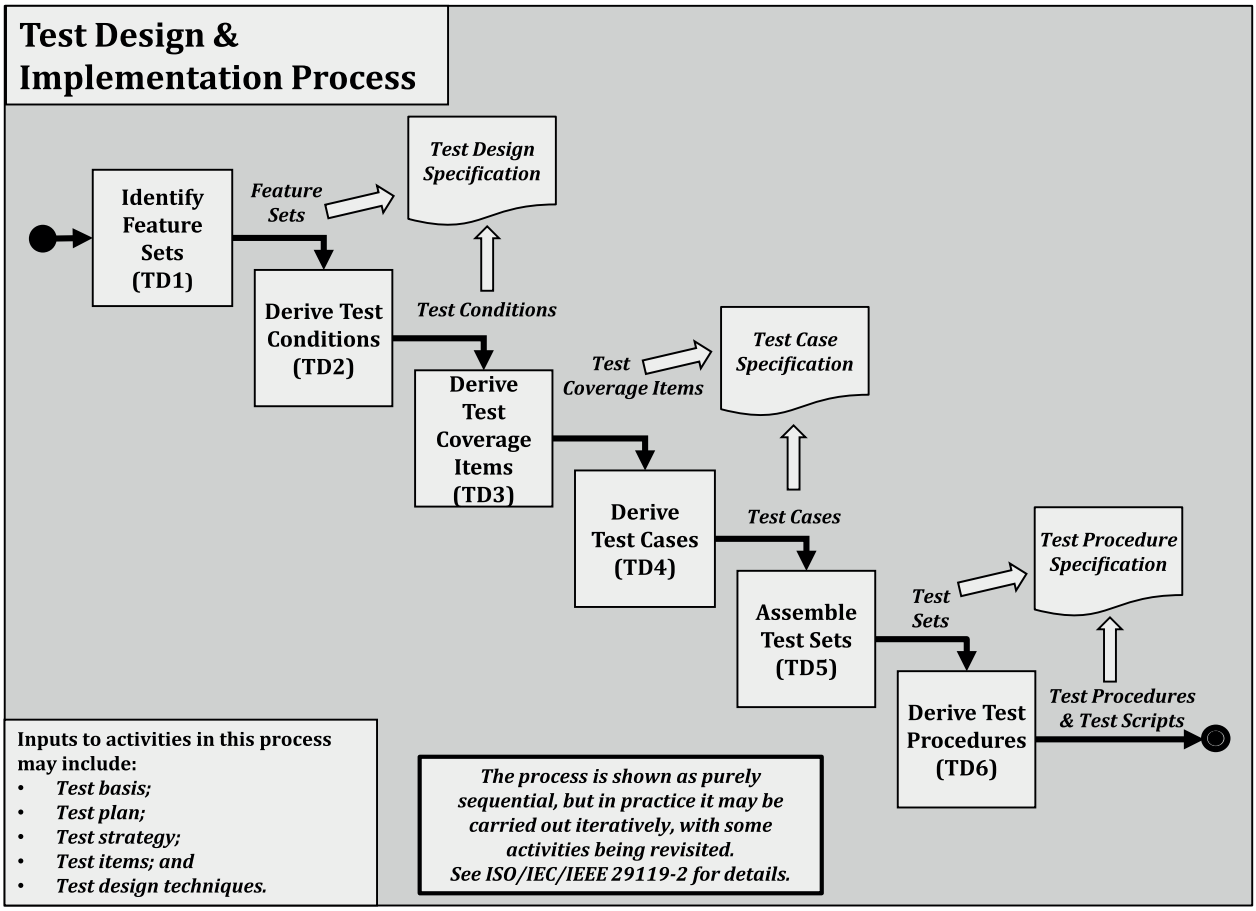

Figure 1 — ISO/IEC/IEEE 29119-2 Test Design and Implementation Process

ISO/IEC/TR 19759 (SWEBOK) defines two types of requirements: functional requirements and quality requirements. ISO/IEC 25010 defines eight quality characteristics (including functionality) that can be used to identify types of testing that may be applicable for testing a specific test item. Annex A provides example mappings of test design techniques that apply to testing quality characteristics defined in ISO/IEC 25010.

Experience-based testing practices like exploratory testing and other test practices such as model-based testing are not defined in this part of ISO/IEC/IEEE 29119 because this part of ISO/IEC/IEEE 29119 only describes techniques for designing test cases. Test practices such as exploratory testing are described in ISO/IEC/IEEE 29119-1.

Templates and examples of test documentation that are produced during the testing process are defined in ISO/IEC/IEEE 29119-3 Test Documentation. The test techniques in this part of ISO/IEC/IEEE 29119 do not describe how test cases should be documented (e.g. they do not include information or guidance on assigning unique identifiers, test case descriptions, priorities, traceability, or pre-conditions). Information on how to document test cases can be found in ISO/IEC/IEEE 29119-3.

This part of ISO/IEC/IEEE 29119 aims to provide stakeholders with the ability to design test cases for the testing of software in any organization.

Software and systems engineering — Software testing —

Part 4: Test techniques

1 Scope

This part of ISO/IEC/IEEE 29119 defines test design techniques that can be used during the test design and implementation process that is defined in ISO/IEC/IEEE 29119-2.

This part of ISO/IEC/IEEE 29119 is intended for, but not limited to, testers, test managers, and developers, particularly those responsible for managing and implementing software testing.

2 Conformance

2.1 Intended Usage

The normative requirements in this part of ISO/IEC/IEEE 29119 are contained in Clauses 5 and 6. It is recognised that particular projects or organizations may not need to use all of the techniques defined by this standard. Therefore, implementation of this standard typically involves selecting a set of techniques suitable for the project or organization. There are two ways that an organization or individual can claim conformance to the provisions of this standard – full conformance or tailored conformance. The organization or individual shall assert whether full or tailored conformance to this standard is claimed.

2.2 Full Conformance

Full conformance is achieved by demonstrating that all of the requirements (i.e. 'shall' statements) of the chosen (non-empty) set of techniques in Clause 5 and/or the corresponding test coverage measurement approaches in Clause 6 have been satisfied.

EXAMPLE An organization could choose to conform only to one technique, such as boundary value analysis. In this scenario, the organization would only be required to provide evidence that they have met the requirements of that one technique in order to claim conformance to this part of ISO/IEC/IEEE 29119.

2.3 Tailored Conformance

Tailored conformance is achieved by demonstrating that the chosen subset of requirements from the chosen (non-empty) set of techniques and/or corresponding test coverage measurement approaches have been satisfied. Where tailoring occurs, justification shall be provided (either directly or by reference) whenever the normative requirements of a technique defined in Clause 5 or measure defined in Clause 6 are not followed completely. All tailoring decisions shall be recorded with their rationale, including the consideration of any applicable risks. Tailoring shall be agreed by the relevant stakeholders.

3 Normative References

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC/IEEE 29119-1, *Software and systems engineering — Software testing — Part 1: Concepts and definitions*

ISO/IEC/IEEE 29119-2, *Software and systems engineering — Software testing — Part 2: Test processes*

ISO/IEC/IEEE 29119-3, *Software and systems engineering — Software testing — Part 3: Test documentation*

NOTE Other International Standards useful for the implementation and interpretation of this part of ISO/IEC/IEEE 29119 are listed in the bibliography.