IEEE Standard for Software and System Test Documentation

IEEE Computer Society

Sponsored by the
Software & Systems Engineering Standards Committee

829™

IEEE
3 Park Avenue
New York, NY 10016-5997, USA

18 July 2008

IEEE Std 829™-2008
(Revision of
IEEE Std 829-1998)

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Approved 27 March 2008

IEEE-SA Standards Board

Abstract: Test processes determine whether the development products of a given activity conform to the requirements of that activity and whether the system and/or software satisfies its intended use and user needs. Testing process tasks are specified for different integrity levels. These process tasks determine the appropriate breadth and depth of test documentation. The documentation elements for each type of test documentation can then be selected. The scope of testing encompasses software-based systems, computer software, hardware, and their interfaces. This standard applies to software-based systems being developed, maintained, or reused (legacy, commercial off-the-shelf, Non-Developmental Items). The term “software” also includes firmware, microcode, and documentation. Test processes can include inspection, analysis, demonstration, verification, and validation of software and software-based system products.

Keywords: integrity level, life cycle, test documentation, testing

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PDF: ISBN 978-0-7381-5746-7 STD95799
Print: ISBN 978-0-7381-5747-4 STDPD95799

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Introduction

This introduction is not part of IEEE Std 829-2008, IEEE Standard for Software and System Test Documentation.

Software and software-based systems testing is a technical discipline of systems engineering. The purpose of software and software-based systems testing is to help the development organization build quality into the software and system during the life cycle processes and to validate that the quality was achieved. The test process determines whether the products of a given life cycle activity conform to the requirements of that activity, and whether the product satisfies its intended use and user needs. This determination can include inspection, demonstration, analysis, and testing of software and software-based system products. Test activities are performed in parallel with software and system development, not just at the conclusion of the development effort.

The test activities provide objective data and conclusions about software and system quality. This feedback can include anomaly identification, performance measurement, and identification of potential quality improvements for expected operating conditions across the full spectrum of the software-based systems and their interfaces. Early feedback allows the development organization to modify the products in a timely fashion and thereby reduce overall project and schedule impacts. Without a proactive approach, anomalies and associated changes are typically delayed to later in the schedule, resulting in greater costs and schedule delays.

This revision of the standard makes significant changes from the prior version. The following is a summary of the changes:

— Changed focus from being document-focused to being process-focused in keeping with IEEE/EIA Std 12207.0™-1996[a] while retaining information on test documentation.

— Added the concept of an integrity level to assist organizations in determining a recommended minimum set of testing tasks and concurrent selection of test documentation needed to support the tasks.

— Identified minimum recommended tasks for the sample integrity level scheme.

— Added an activity for choosing appropriate documents and contents.

— Added a Master Test Plan (MTP) for documenting the actual management of the total test effort.

— Added a Level Interim Test Status Report to be issued during the test execution activity.

— Added a Master Test Report for when there are multiple Level Test Reports that need consolidation. The Master Test Report may also summarize the results of the tasks identified in the Master Test Plan.

— Identified sample metrics in Annex E.

— Added the concept of independence in Annex F.

The following key concepts are emphasized in this standard:

— *Integrity levels.* Defines four integrity levels (ranging from high integrity to low integrity) to describe the importance of the software and the software-based system to the user.

[a] IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, Piscataway, NJ 08854, USA (http://standards/ieee.org/).

— *Recommended minimum testing tasks for each integrity level.* Defines the recommended minimum testing tasks required for each of the four integrity levels. Includes a table of optional testing tasks for tailoring the test effort to meet project needs and application specific characteristics.

— *Intensity and rigor applied to testing tasks.* Introduces the notion that the intensity and rigor applied to the testing tasks vary according to the integrity level. Higher integrity levels require the application of greater intensity and rigor to the testing tasks. Intensity includes greater scope of testing across all normal and abnormal system operating conditions. Rigor includes more formal techniques and recording procedures.

— *Detailed criteria for testing tasks*. Defines specific criteria for each testing task, including recommended minimum criteria for correctness, consistency, completeness, accuracy, readability, and testability. The testing task descriptions include a list of the required task inputs and outputs.

— *Systems viewpoint*. Includes recommended minimum testing tasks to respond to system issues.

— *Selection of test documentation*. Both the types of test documentation and the content topics within each documentation type need to be selected based on the testing tasks associated with the identified integrity level.

Compliance with International and IEEE Standards. Defines the test processes to be compliant with life cycle process standards such as ISO/IEC 12207:1995,[b] IEEE Std 1074™-2006 and IEEE/EIA Std 12207.0-1996 as well as the entire family of IEEE software and systems engineering standards. This standard supports the full software life cycle processes, including acquisition, supply, development, operation, and maintenance. The standard is compatible with all life cycle models; however, not all life cycle models use all of the life cycle processes described in this standard.

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1. Overview

This standard supports all software life cycle processes, including acquisition, supply, development, operation, and maintenance. This standard is compatible with all life cycle models. Not all life cycle models use all of the life cycle processes listed in this standard.

System and software test processes determine whether the outcomes of a given activity conform to the requirements of that activity and whether the development product satisfies its intended use and user needs. The determination may include analysis, demonstration, inspection, and testing of software products.

The user of this standard may invoke those software life cycle processes and the associated test processes that apply to the project. A description of the software life cycle processes may be found in ISO/IEC 12207:1995 [B24],[1] IEEE Std 1074™-2006 [B17], and IEEE/EIA Std 12207.0™-1996 [B21].

1.1 Scope

This standard applies to all software-based systems. It applies to systems and software being developed, acquired, operated, maintained, and/or reused [e.g., legacy, modified, Commercial-Off-the-Shelf (COTS), Government-Off-the-Shelf (GOTS), or Non-Developmental Items (NDIs)]. When conducting the test process, it is important to examine the software in its interactions with the other parts of the system. This standard identifies the system considerations that test processes and tasks address in determining system and software correctness and other attributes (e.g., completeness, accuracy, consistency, and testability), and the applicable resultant test documentation.

[1]The numbers in brackets correspond to those of the bibliography in Annex A.