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IEEE Standard for Software Unit Testing

Sponsor

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of the
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Forward

(This forward is not a part of ANSI/IEEE Std 1008-1987, IEEE Standard for Software Unit Testing)

Objectives

This standard's primary objective is to specify a standard approach to software unit testing that can be used as a basis for sound software engineering practice.

A second objective is to describe the software engineering concepts and testing assumptions on which this standard approach is based. This information is contained in Appendix B. Note that Appendix B is not a part of this standard.

A third objective is to provide guidance and resource information to assist with the implementation and usage of the standard unit testing approach. This information is contained in Appendixes A, C, and D. Note that these Appendixes are not a part of this standard.

Motivation

A consensus definition of sound unit testing provides a baseline for the evaluation of specific approaches. It also aids communication by providing a standard decomposition of the unit testing process.

Audience

The primary audience for this standard is unit testers and unit test supervisors. This standard was developed to assist those who provide input to, perform, supervise, monitor, and evaluate unit testing.

Relationship with Other Software Engineering Standards

ANSI/IEEE Std 829-1983, IEEE Standard for Software Test Documentation, describes the basic information needs and results of software testing. This unit testing standard requires the use of the test design specification and test summary report specified in ANSI/IEEE Std 829-1983.

This standard is one of a series aimed at establishing the norms of professional practice in software engineering. Any of the other software engineering standards in the series may be used in conjunction with it.

Terminology

Terminology in this standard is consistent with ANSI/IEEE Std 729-1983, IEEE Standard Glossary of Software Engineering Terminology. To avoid inconsistency when the glossary is revised, its definitions are not repeated in this standard.

The *test unit* referred to in this standard is a specific case of the *test item* referred to in ANSI/IEEE 829-1983. The term *test unit* is used because of this standard's narrower scope.

The use of the term specification, description, or document refers to data recorded on either an electronic or paper medium.

The word must and imperative verb forms identify mandatory material within the standard. The words should and may identify optional material.

Overview

The unit testing process is composed of three *phases* that are partitioned into a total of eight basic *activities* as follows:

- 1) *Perform the test planning*
 - a) Plan the general approach, resources, and schedule
 - b) Determine features to be tested
 - c) Refine the general plan
- 2) *Acquire the test set*
 - a) Design the set of tests
 - b) Implement the refined plan and design
- 3) *Measure the test unit*
 - a) Execute the test procedures
 - b) Check for termination
 - c) Evaluate the test effort and unit

The major dataflows into and out of the phases are shown in Fig A.

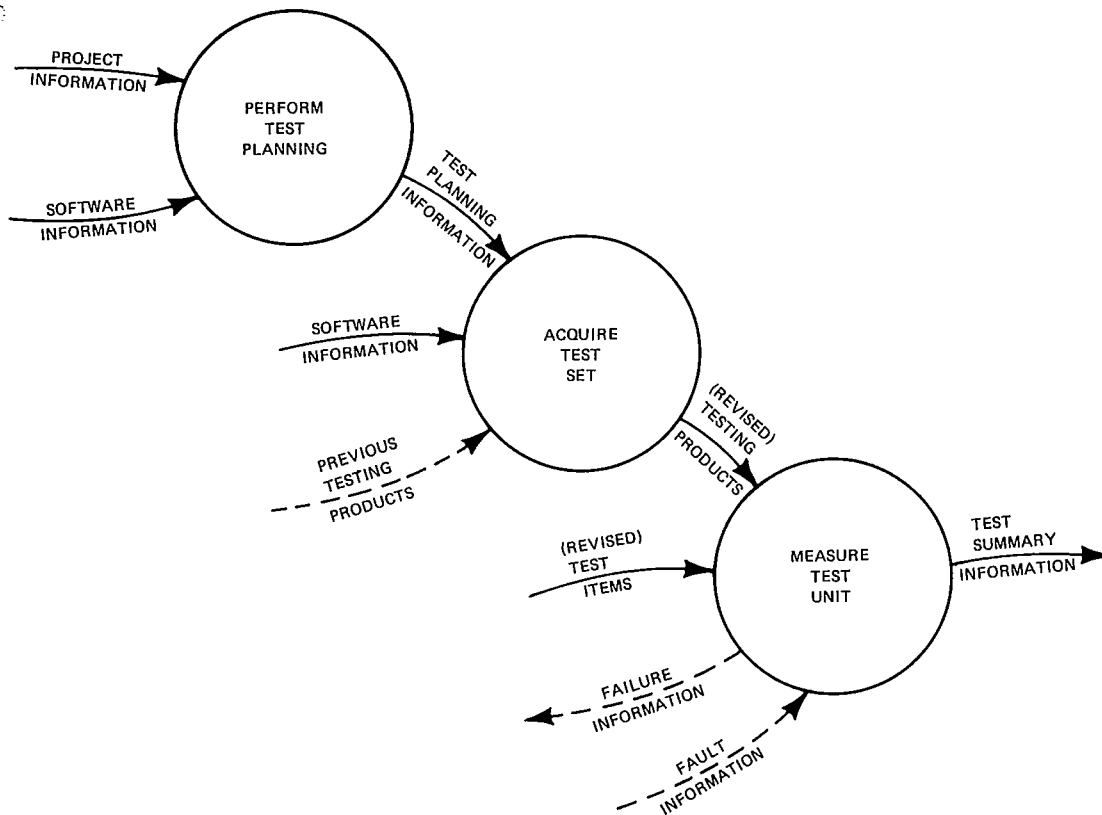


Fig A — Major Dataflows of the Software Unit Testing Phases

Within a phase, each basic activity is associated with its own set of inputs and outputs and is composed of a series of tasks. The inputs, tasks, and outputs for each activity are specified in the body of this standard.

The set of outputs from all activities must contain sufficient information for the creation of at least two documents—a test design specification and a test summary report. Both documents must conform to the specifications in ANSI/IEEE Std 829-1983.

History

Work on this standard began in February 1983, following announcement of the formation of the task group in the technical and commercial press in late 1982. The project authorization request was approved by the IEEE Standards Board on June 23, 1983 following the second meeting. A total of seven meetings held throughout the United States at three month intervals produced the draft submitted for ballot in March 1985. A total of over 90 persons contributed to the initial development of this standard. Contributors are those individuals who either attended a working-group meeting, submitted written comments on a draft, or both.

This standard was developed by a working group with the following members:

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An American National Standard

IEEE Standard for Software Unit Testing

1. Scope and References

1.1 Inside the Scope

Software unit testing is a process that includes the performance of test planning, the acquisition of a test set, and the measurement of a test unit against its requirements. Measuring entails the use of sample data to exercise the unit and the comparison of the unit's actual behavior with its required behavior as specified in the unit's requirements documentation.

This standard defines an integrated approach to systematic and documented unit testing. The approach uses unit design and unit implementation information, in addition to unit requirements, to determine the completeness of the testing.

This standard describes a testing process composed of a hierarchy of phases, activities, and tasks and defines a minimum set of tasks for each activity. Additional tasks may be added to any activity.

This standard requires the performance of each activity. For each task within an activity, this standard requires either that the task be performed, or that previous results be available and be reverified. This standard also requires the preparation of two documents specified in ANSI/IEEE Std 829-1983 [2]¹. These documents are the Test Design Specification and the Test Summary Report.

General unit test planning should occur during overall test planning. This general unit test planning activity is covered by this standard, although the balance of the overall test planning process is outside the scope of this standard.

This standard may be applied to the unit testing of any digital computer software or firmware. However, this standard does *not* specify any class of software or firmware to which it must be applied, nor does it specify any class of software or firmware that must be unit tested. This standard applies to the testing of newly developed and modified units.

This standard is applicable whether or not the unit tester is also the developer.

¹The numbers in brackets correspond to the references listed in 1.3 of this standard.