

WITHDRAWN

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Supplement to IEEE Standard for Information Technology— Software Reuse—Data Model for Reuse Library Interoperability: Asset Certification Framework

Sponsor

**Software Engineering Standards Committee
of the
IEEE Computer Society**

Developed in cooperation with the

Reuse Library Interoperability Group (RIG)

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Abstract: A consistent structure for describing a reuse library's asset certification policy in terms of an Asset Certification Framework is defined, along with a standard interoperability data model for interchange of asset certification information.

Keywords: certification, data model, interoperability, quality factors, reuse libraries, software

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Introduction

(This introduction is not part of IEEE Std 1420.1a-1996, Supplement to IEEE Standard for Information Technology—Software Reuse—Data Model for Reuse Library Interoperability: Asset Certification Framework.)

This guide was developed as the result of a collaboration between the Reuse Library Interoperability Group (RIG) and the Software Engineering Standards Committee (SESC) of the IEEE Computer Society. The RIG is a volunteer organization of experts from the industrial, government, and academic communities working together to create consensus-based specifications for the interoperation of software reuse libraries. Under the terms of a Memorandum of Understanding with the IEEE, the RIG develops specifications and other documents on this subject and submits them to SESC. The RIG then responds to the IEEE Sponsor Balloting process in order to improve the documents and widen the community of consensus. Following normal IEEE rules and procedures, the documents are finally published as IEEE standards.

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Supplement to IEEE Standard for Information Technology—Software Reuse—Data Model for Reuse Library Interoperability: Asset Certification Framework

1. Overview

This standard describes an Asset Certification Framework for defining the asset certification techniques of a reuse library.

Clause 1 provides the scope and purpose of this document. Clause 2 provides related references that are important for applying this standard. Additional references are listed in the bibliography in Annex A. Clause 3 defines important terms used in this document. Clause 4 describes the Asset Certification Framework. Clause 5 defines the Asset Certification Data Model that extends the Basic Interoperability Data Model (BIDM) for certification.

1.1 Scope

The Asset Certification Framework defines a standard for the consistent structure, labeling, and description of the evaluation and certification of software assets. An asset is any item of interest that is stored in a reuse library, such as design documentation, specifications, source code, documentation, test suites, etc., or other unit of potential value to a reuser. Asset evaluation and certification refers to the process of determining whether an asset conforms to a predetermined criteria appropriate for that asset.

1.2 Purpose

The purpose of this document is to define a consistent structure for describing a reuse library's asset certification policy in terms of an Asset Certification Framework. This document defines a standard interoperability *data model* for interchange of asset certification information.

A *reuse library* is comprised of a collection of assets, a community of subscribers, a set of operational policies and procedures, a library mechanism, and support services (e.g., user's manual, on-line help) for sub-

scribers. A reuse library's *certification policy* includes the definition of asset certification criteria and processes. *Interoperability*, the sharing of assets among reuse libraries, improves the value and impact of reuse libraries and provides greater visibility and reuse of assets. A consistent certification standard will improve the reuser's understanding of what evaluation and certification criteria have been met, thereby increasing confidence in assets and leading to higher levels of reuse.

1.3 Requirements

Several U.S. government and industry reuse libraries organize their certification policies by *certification levels*. The certification levels serve to organize the library's certification activities and provide a quick reference for the reuser. User response to the notion of certification levels has been universally positive. However, each library has defined their levels differently. Thus for the users of multiple libraries, the different levels and schemes are confusing. Asset interchange between libraries is complicated by such similar, but different certification levels. However, there is no agreement as to a standard set of levels at this time.

In addition, several commercial standards specify requirements for certification of software including the ISO 9000 series, ISO/IEC 12119: 1994 [B15],¹ and IEEE Std 1061-1992.² Even though these standards do not have any notion of "levels," each reuse library organization is likely to define certification policies that are unique to its own particular situation and compliant with some subset of these standards. Particularly with the Internet allowing broader user access to multiple reuse libraries, asset interchange should somehow include information about what certification activities have been performed on an asset.

The requirement for the Asset Certification Framework is to allow each reuse library organization to define asset certification policies particular to its needs, but to prescribe a standard way to organize and communicate those policies. This will assist the potential asset reuser in the following ways:

- Provide a common basis for comparing the certification policies of different reuse libraries.
- Provide a common basis for understanding a reuse library's certification policy.
- Provide a common basis for understanding what certification activities have been performed on a specific asset.
- Define a standard interchange data model for exchanging certification policies.
- Define a standard interchange data model for exchanging certification information about an asset.

1.4 Relationship with other standards and projects

The Asset Certification Framework is designed to be a supplement to the Basic Interoperability Data Model (BIDM) standard developed by the Reuse Library Interoperability Group (RIG) and published by IEEE as IEEE Std 1420.1-1995. The BIDM defines the minimum set of information about assets that reuse libraries should be able to exchange to support interoperability.

The Asset Certification Framework defines an annex of additional information that is used in addition to the BIDM for describing reuse library certification policies.

This document follows the style of the BIDM by defining the classes, attributes, and relationships in a format compatible with EIA/IS-81, the CASE Data Interchange Format (CDIF) [B7].

The Asset Certification Framework is structured using certification quality factors that are based upon those defined in ISO/IEC 9126: 1991 and of those software quality factors in IEEE Std 1061-1992.

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

²Information on references can be found in Clause 2.

1.5 Conformance

Use of this standard is a conforming usage if it adheres to the Asset Certification Framework data model presented in Clause 5. All other clauses of this standard are advisory in nature. The suggested terms defined for Certification Quality Factors (4.2.2), Certification Method (4.2.4), and Element Type (4.2.5) are provided for guidance and are not required for conformance.

2. References

This standard shall be used in conjunction with the following publications:

IEEE Std 1420.1-1995, IEEE Standard for Information Technology—Software Reuse—Data Model for Reuse Library Interoperability: Basic Interoperability Data Model (BIDM) (ANSI).³

ISO/IEC 9126: 1991, Information technology—Software product evaluation—Quality characteristics and guidelines for their use.⁴

IEEE Std 1061-1992, IEEE Standard for a Software Quality Metrics Methodology (ANSI).

3. Definitions

3.1 asset: An item of interest that is stored in a reuse library, such as design documentation, specifications, source code, documentation, test suites, etc., or any other unit of information of potential value to a reuser.

3.2 Asset Certification Framework: A technique and associated data model used for organizing, selecting, communicating, and guiding the process of certifying assets.

3.3 certificate: A statement that an asset has been assessed according to specified certification criteria.

3.4 certification artifact: The tangible results from a certification process (e.g., inspection checklists, metrics, problem reports).

3.5 certification criteria: A set of standards, rules, or properties to which an asset must conform in order to be certified to a certain level. Certification criteria are defined by a certification policy. Certification criteria may be specified as a set of certification properties that must be met.

3.6 certification levels: The step-wise organization of a certification policy by a reuse library into increasingly more stringent certification processes and criteria.

3.7 certification method: A documented technique applied as part of a certification process (e.g., inspections, static analysis, testing, or formal verification).

3.8 certification policy: The statement of a reuse library's standard process for asset certification, the levels of certification, the properties and criteria for each level, and the methods employed.

³IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

⁴ISO/IEC publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembé, CH-1211, Genève 20, Switzerland/Suisse. ISO/IEC publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

3.9 certification process: The process of assessing whether an asset conforms to predetermined certification criteria appropriate for that class of asset.

3.10 certification property: A statement about some feature or characteristic of an asset that may be assessed as being true or false during a certification process. Properties may relate to what an asset is, what it does, or how it relates to its operating environment. An assessment of a certification quality factor is accomplished by assessing the underlying certification properties.

3.11 certification quality factor: A high-level aspect of an asset (e.g., completeness, correctness, or reusability) that is assessed during a certification process. A certification quality factor is a manifestation of one or more certification properties.

3.12 elements: The discrete pieces that make up an asset (e.g., documents, requirements specifications, test cases, source code, installation information, and read-me files).

3.13 element type: A category or class of elements.

4. Asset Certification Framework

The Asset Certification Framework defines a standard representation for describing and comparing certification policies and for reporting what certification activities have been accomplished on specific assets. This clause describes the Asset Certification Framework. Clause 5 provides the associated data model for the Asset Certification Framework as a compatible extension to the BIDM.

4.1 Overview of the asset certification process

Assets are composed of one or more *elements*, representing the individual pieces of the asset, often stored in separate files. Elements may include source code, executables, test cases, and documentation. A specific version of an asset is therefore composed of specific versions of each element. Changing one or more of an asset's elements results necessarily in a new asset version.

Certifying an asset involves performing a *certification process* on its elements, as shown in Figure 1.

The certification process is specified in the reuse library's *certification policy*, which is organized according to *certification levels* that prescribe increasingly more stringent certification methods. The certification policy defines, for each level, the process for that level, the methods and tools to be employed, and the criteria to be met.

The result of the certification process is a set of *certification artifacts* (e.g., inspection checklists, metrics, and problem reports) that result from applying the methods and tools. These certification artifacts could include the results from the standard classification for anomalies defined in IEEE Std 1044-1993 [B13] and IEEE Std 1044.1-1995 [B14].

A *certificate* summarizes the results of the certification process. The certificate and associated certification artifacts only apply to a specific version of an asset and its elements. New versions of that asset are treated like new assets and must be recertified.

4.2 Framework definition

The Asset Certification Framework prescribes the specification of a reuse library's certification policy. A tabular view of this information is depicted in Figure 2.

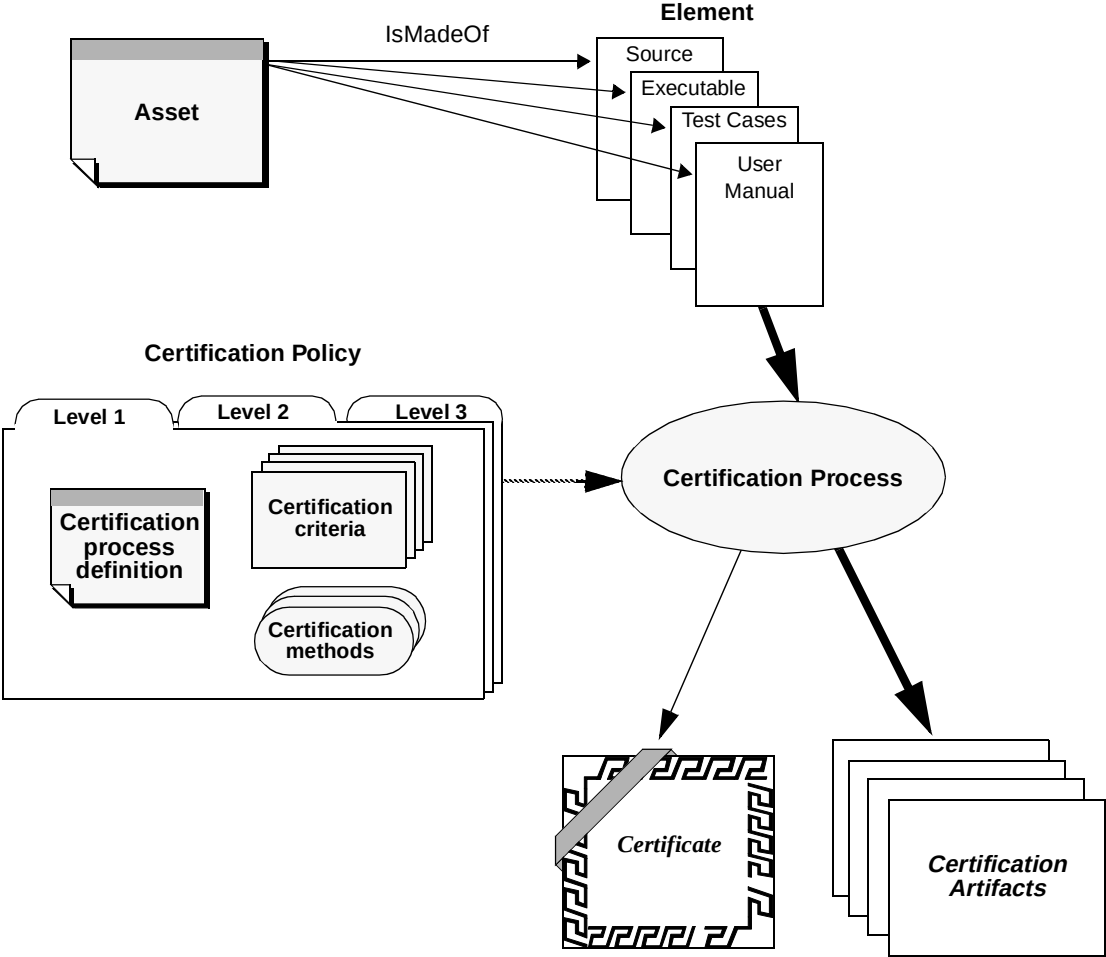


Figure 1—Asset certification process

Certification Levels	Certification Quality Factor	Certification Property		Element Type
		Property Description	Certification Method	
1				
2				
...				

Figure 2—Tabular view of the Asset Certification Framework