INTERNATIONAL STANDARD

ISO/IEC 14392

First edition
1996-06-01

Information technology — Directory services — Application Program Interface (API) [Language independent]

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Technologies de l'information — Services de l'annuaire — Interface de programme d'application (API) [indépendante du langage]

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Reference number
ISO/IEC 14392:1996(E)

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Printed in Switzerland

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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. 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.

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International Standard ISO/IEC 14392 was prepared by IEEE (as IEEE Std 1224.2-1993) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

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Annexes A and B of this International Standard are for information only.

Introduction

(This introduction is not a normative part of ISO/IEC 14392, Information technology—Directory services—Application Program Interface (API) [Language independent], but is included for information only.)

The purpose of this International Standard is to define an application program interface (API) to directory services, including, but not limited to, the services described in ISO/IEC 9594: 1990 and the CCITT X.500 Series recommendations (References {5–11}) in terms that are independent of any particular programming language.

Related Standards

This International Standard is intended to provide the basis for the definition of programming language bindings to which implementations and applications can conform. Such a language binding to this International Standard, for the C programming language, is contained in ISO/IEC 14394 {B9}.

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The API that this International Standard defines uses the mechanism for OSI abstract data manipulation (OM) defined in ISO/IEC 14360 {12}.

This International Standard, and the language bindings derived from it, may be used in conjunction with related APIs, such as the API to X.400–based messaging services defined in ISO/IEC 14361 {13}.

ISO/IEC 14393 {14} contains a set of requirements to be satisfied by test methods for measuring conformance to this International Standard. They are stated in terms that are independent of any particular programming language, and they apply to test methods for measuring conformance to all standards defining programming language bindings of this International Standard.

Overview

This International Standard defines a mandatory generic interface to directory services and an optional extension of that interface for use in conjunction with the service described in ISO/IEC 9594: 1990 and the CCITT X.500 Series recommendations (References {5–11}).

Related Standards Activities

The following areas are under active consideration at this time, or are expected to become active in the near future, concerning standards for APIs that are related to the API defined in this International Standard. Similar efforts can be anticipated in the future.[1)]

(1) X.400-based message handling

(2) FTAM API

(3) Other OSI application layer APIs

(4) Network interface facilities

(5) System administration.

This International Standard is based on IEEE Std 1224.2-1993 {B10}, which was prepared by the Namespace and Directory Services Working Group (P1224.2, formerly P1003.17), sponsored by the Portable Applications Standards Committee of the IEEE Computer Society.

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1) A *Standards Status Report* that lists all current IEEE Computer Society standards projects is available from the IEEE Computer Society, 1730 Massachusetts Avenue NW, Washington, DC 20036-1903, USA; Telephone: (+1) 202 371-0101; Fax: (+1) 202 728-9614.

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Information technology—Directory services—Application Program Interface (API) [Language independent]

Section 1: General

1.1 Scope

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A directory is a distributed collection of information, which programs can access in order to make queries or updates. This International Standard defines an application program interface (API) to directory services. This API is known as the directory services API (DS API). It is referred to as *the interface* throughout this International Standard.

This International Standard defines a standard directory service interface to support application portability at the source-code level. It is intended to be used by both application developers and directory service implementors.

The interface defined in this International Standard is intended to be used to provide access to a range of directory services that are instances of a common abstract model. That model is defined in the 1988 CCITT X.500 Series recommendations and ISO/IEC 9594. The CCITT Recommendations and ISO/IEC 9594 {5–11}[1)] were developed in close collaboration and are technically aligned. Hereinafter, they are referred to as *the X.500 directory standards*. A summary description of the model is contained in A.2.

This International Standard prescribes how the interface that it defines is to be used to access the particular directory service defined in the X.500 directory standards and indicates how it may be used to access other particular directory services that conform to the same abstract model.

1) The numbers in curly brackets correspond to those of the references in 1.2. When preceded by a "B," the numbers correspond to those of the bibliography in Annex B.

This International Standard defines an API that application programs can use to access the functionality of the underlying directory service. It does not define or imply any profile of that service.

Nothing in this International Standard requires that the implementation of the interface or the directory itself actually make use of the Directory Access Protocol (DAP), the Directory System Protocol (DSP), or other parts of the model, just so long as it provides the defined service. Also, the *scope* of the directory to which an application has access is not determined. It is entirely a local matter whether objects in other directory system agents (DSAs) are accessible.

The interface is designed for operational interactions with a directory, rather than for management interactions, such as knowledge management or schema management. Also, security features are not generally visible in the interface in order to permit flexibility in security policies.

It is intended that an application program should be able to use the interface defined in this International Standard to access a single directory service or to access several directory services at the same time.

This International Standard uses concepts of OSI abstract data manipulation (OM) that are defined in ISO/IEC 14360 {12}. They are summarized in A.3.

The directory service interface is defined in this International Standard in a programming language independent manner. It contains:

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— Definitions of the interface operations

— Definitions of the information structures used in the interface that are associated with the abstract model of directory services

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— Definitions of the information structures used in the interface that are associated with the particular instance of the model that is defined in ISO/IEC 9594 {5}-{11}.

This International Standard describes the external characteristics and facilities that are of importance to applications developers, rather than the internal construction techniques employed to achieve these capabilities. Special emphasis is placed on those functions and facilities that are needed in a wide variety of commercial applications.

This International Standard is defined exclusively at the source-code level. The objective is that a conforming application source program can be translated to execute in conjunction with one or more conforming implementations.

1.2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

{1} ISO/IEC 8824: 1990 (CCITT Recommendation X.208: 1988),[2] *Information technology—Open Systems Interconnection—Specification of Abstract Syntax Notation One (ASN.1).*

{2} ISO/IEC 8825: 1990 (CCITT Recommendation X.209: 1988), *Information technology—Open Systems Interconnection—Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*

{3} ISO/IEC 9072-1: 1989 (CCITT Recommendation X.219: 1988), *Information processing systems—Text communication—Remote Operations—Part 1: Model, notation and service definition.*

{4} ISO/IEC 9072-2: 1989 (CCITT Recommendation X.229: 1988), *Information processing systems—Text communication—Remote Operations—Part 2: Protocol specification.*

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{5} ISO/IEC 9594-1: 1990 (CCITT Recommendation X.500: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 1: Overview of concepts, models and services.*

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{6} ISO/IEC 9594-2: 1990 (CCITT Recommendation X.501: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 2: Models.*

{7} ISO/IEC 9594-3: 1990 (CCITT Recommendation X.511: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 3: Abstract service definition.*

{8} ISO/IEC 9594-4: 1990 (CCITT Recommendation X.518: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 4: Procedures for distributed operation.*

{9} ISO/IEC 9594-6: 1990 (CCITT Recommendation X.520: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 6: Selected attribute types.*

{10} ISO/IEC 9594-7: 1990 (CCITT Recommendation X.521: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 7: Selected object classes.*

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2) ISO/IEC documents can be obtained from the ISO Central Secretariat, 1 Rue de Varembé, Case Postale 56, CH-1211, Genève 20, Switzerland/Suisse. CCITT documents can be obtained from the Telecommunication Standardization Bureau of the International Telecommunication Union, Sales Section, Place des Nations, CH-1211, Genève 20, Switzerland/Suisse.

{11} ISO/IEC 9594-8: 1990 (CCITT Recommendation X.509: 1988), *Information technology—Open Systems Interconnection—The Directory—Part 8: Authentication framework.*

{12} ISO/IEC 14360: 1996, *Information technology—Open Systems Interconnection (OSI) abstract data manipulation—Application Program Interface (API) [Language independent].*

{13} ISO/IEC 14361: 1996, *Information technology—MHS-based electronic messaging—Application Program Interface (API) [Language independent].*

{14} ISO/IEC 14393: 1996, *Information technology—Test methods for measuring conformance to directory services—Application Program Interface (API) [Language independent].*

{15} CCITT Recommendation F.200: 1984, *Teletex Service.* CCITT Red Book, Fascicle II.5.

{16} CCITT Series T Recommendations: Terminal Equipment and Protocols for Telematic Services, Fascicle VII.3, 1984.

1.3 Conformance

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1.3.1 Implementation Conformance

1.3.1.1 Conformance Requirements

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A conforming implementation for a programming language binding specification for this International Standard shall meet all of the following criteria:

(1) The implementation shall support all required behavior defined in this International Standard.

(2) The implementation shall support all required interfaces defined in the programming language binding specification. Those interfaces shall support the behavior described in this International Standard and in the programming language specification.

(3) The implementation may provide additional functions or facilities not required by this International Standard or by the programming language binding specification. Each such nonstandard extension shall be identified as such in the system documentation. Nonstandard extensions, when used, may change the behavior of functions or facilities defined by this International Standard or by the programming language binding specification. The conformance document shall define an environment in which an application can be run with the behavior specified by this International Standard and the programming language binding specification. In no case shall such an environment require modification of a Strictly Conforming Application.

1.3.1.2 Conformance Documentation

A conformance document with the following information shall be available for an implementation claiming conformance to a programming language binding specification for this International Standard. The conformance document shall be in two parts. The first part shall have the same structure as this International Standard, with the information presented in the appropriately numbered sections, clauses, and subclauses. The second part shall have the same structure as the programming language binding specification, with the information presented in the appropriately numbered sections, clauses, and subclauses. The conformance document shall not contain information about extended features or capabilities outside the scope of this International Standard and the programming language binding specification.

The conformance document shall identify the programming language binding specification to which the implementation conforms.

The conformance document shall contain a statement that indicates the full names, numbers, and dates of the language-independent and programming language binding specification standards that apply.

The conformance document shall state which of the optional features defined in this International Standard and in the programming language binding specification are supported by the implementation.

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The conformance document shall describe the behavior of the implementation for all implementation-defined features defined in this International Standard and in the programming language binding specification. This requirement shall be met by listing these features and by providing either a specific reference to the system documentation or full syntax and semantics of these features. The conformance document may specify the behavior of the implementation for those features where this International Standard or the programming language binding specification states that implementations may vary or where features are identified as undefined or unspecified.

No specifications other than those specified by this International Standard and the programming language binding specification shall be present in the conformance document.

The phrases “shall document” or “shall be documented” in this International Standard or in a programming language binding specification for this International Standard mean that documentation of the feature shall appear in the conformance document, as described previously, unless the system documentation is explicitly mentioned.

The system documentation should also contain the information found in the conformance document.