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Information technology — Framework and taxonomy of International Standardized Profiles —

Part 3:

Principles and Taxonomy for Open System
Environment profiles

*Technologies de l'information — Cadre et taxonomie des profils
normalisés internationaux —*

*Partie 3: Principes et taxonomie pour profils d'environnement de système
ouvert*



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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.

The main task of technical committees is to prepare International Standards. In exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 10000-3, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC TR 10000 consists of the following parts, under the general title *Information technology — Framework and taxonomy of International Standardized Profiles*:

- *Part 1: General principles and documentation framework*
- *Part 2: Principles and Taxonomy for OSI profiles*
- *Part 3: Principles and Taxonomy for Open System Environment profiles*

Introduction

The context of Functional Standardization is one part of the overall field of IT standardization activities covering

- Base Standards, which define fundamentals and generalized procedures. They provide an infrastructure that can be used by a variety of applications, each of which can make its own selection from the options offered by them.
- Profiles, which define conforming subsets or combinations of base standards used to provide specific functions. Profiles identify the use of particular subsets or options available in the base standards, and provide a basis for the development of uniform, internationally recognized, conformance tests.
- Registration Mechanisms, which provide the means to specify detailed parameterization within the framework of the base standards or profiles.

Within ISO/IEC JTC 1, the process of Functional Standardization is concerned with the methodology of defining profiles, and their publication in documents called "International Standardized Profiles" (ISPs) in accordance with procedures contained in the Directives of JTC 1. The scope of Information Technology standardization to which this process is being applied is that which corresponds to the generally understood, but loosely defined, concept of "Open Systems". The objective is to facilitate the specification of IT systems characterized by a high degree of interoperability and portability of their components.

In addition to ISO/IEC TR 10000, the secretariat of the Special Group on Functional Standardization maintains a standing document (SD-4) entitled "Directory of ISPs and Profiles contained therein". This is a factual record of which ISPs exist, or are in preparation, together with an executive summary of each profile. It is subject to regular updating by the Secretariat of ISO/IEC JTC 1/SGFS.

Information technology - Framework and taxonomy of International Standardized Profiles

Part 3: Principles and Taxonomy for Open System Environment profiles

1 Scope

The purpose of this part of ISO/IEC TR 10000 is to provide the context for functional standardization in support of Open System Environments (OSE). It provides principles and a classification scheme for OSE profiles which may be or have been submitted for ratification as International Standardized Profiles (ISPs).

ISO/IEC TR 10000-1 defines the concept of profiles that are documented as ISPs. This part of ISO/IEC TR 10000 outlines the basic OSE objectives and concepts, and defines an approach and format for OSE profiles specified by International Standardized Profiles. It gives guidance to organizations proposing Draft OSE ISPs, on the nature and content of the documents which may be submitted for ratification as International Standardized Profiles.

An OSE is defined as a comprehensive set of interfaces, services and supporting formats (including user aspects) enabling interoperability and portability of applications, data or people, as specified by information technology standards and profiles. Communication protocols are part of the specification of behavior at certain types of interfaces.

Each OSE profile is created to satisfy a clearly specified set of user requirements. Since profiles will be proposed according to needs identified to SGFS and according to the progress of international base standardization,

the Taxonomy will be periodically updated or have new parts added in order to reflect the progress reached. It is also recognized that there will be proposals for the extension of the taxonomy to cover functions which were not identified during the preparation of this edition of ISO/IEC TR 10000. These extensions may be identified by a variety of proposers and involve simple extensions to the existing Taxonomy or the addition of new functional areas not currently covered by ISO/IEC TR 10000. The inclusion of such extensions is administered following the procedures elaborated by SGFS.

A distinction has been made between a profile and an ISP which documents one or more profiles. The Taxonomy is only concerned with profiles, but further information is given in the "Directory of ISPs and Profiles contained therein" as to which ISP contains the documentation of a profile.

This Directory is maintained as an SGFS standing document SD-4 (see reference in Annex A). For each draft profile submitted to SGFS, it will also provide additional information, including the status of the identified profiles.

2 References

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC TR 10000. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of

ISO/IEC TR 10000 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.

ISO/IEC 9646-1:1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts*. [See also ITU-T Recommendation X.290 (1995)].

ISO/IEC/TR 10000-1:1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1: General principles and documentation framework*.

ISO/IEC/TR 10000-2:1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 2: Principles and Taxonomy for OSI profiles*.

ISO/IEC TR 10183-1:1993, *Information technology - Text and office systems - Office Document Architecture (ODA) and interchange format - Technical Report on ISO 8613 implementation testing - Part 1: Testing methodology*.

ISO/IEC 10641:1993, *Information Technology - Computer graphics and image processing - Conformance testing of implementations of graphics standards*.

ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2: ...¹⁾, *Information technology - Open Systems Interconnection - Data Management and Open Distributed Processing - Basic reference model of open distributed processing: Descriptive model*.

ISO/IEC 13210:1994, *Information technology - Test methods for measuring conformance to POSIX*.

ISO/IEC TR 14252: ...¹⁾, *Guide to the POSIX Open System Environment (OSE)*.

3 Definitions

For the purposes of this part of ISO/IEC TR 10000, the following definitions apply.

3.1 Terms defined in this part of ISO/IEC TR 10000

3.1.1 OSE Profile

A profile which specifies all or part of the behavior of an IT system at one or more of the OSE interfaces.

3.1.2 OSI Profile

A specific OSE profile composed of OSI base standards and/or interchange format and data representation base standards.

3.2 Terms defined in ISO/IEC TR 14252, *Guide to the POSIX Open System Environment (OSE)*

The following terms are defined in ISO/IEC TR 14252, and are included here for convenience.

NOTE - Since ISO/IEC TR 14252 is currently under ballot, this text will be updated when the ballot resolution process is completed.

3.2.1 Application Platform

A set of resources, including hardware and software, that support the services on which application software will run.

The application platform provides services at its interfaces that, as much as possible, make the specific characteristics of the platform transparent to the application software.

3.2.2 Application Program Interface (API)

The interface between application software and application platform, across which all services are provided.

1) To be published

3.2.3 Application Software

Software that is specific to an application and is composed of programs, data, and documentation.

3.2.4 Communication Services Interface (CSI)

The boundary across which access to services for interaction between internal application software entities and application platform external entities is provided.

3.2.5 Human/Computer Interface (HCI)

The boundary across which physical interaction between a human being and the application platform takes place.

3.2.6 Information Services Interface (ISI)

The boundary across which external, persistent storage service is provided.

3.2.7 Interoperability

The ability of two or more systems to exchange information and to mutually use the information that has been exchanged.

3.2.8 Open System Environment (OSE)

A comprehensive set of interfaces, services, and supporting formats, plus user aspects for interoperability or for portability of applications, data, or people, as specified by information technology standards and profiles.

3.2.9 Portability (of Application Software)

The ease with which application software and data can be transferred from one information system to another.

NOTE -See 6.1 for interpretive discussion of the terms defined in 3.2.2, 3.2.4, 3.2.5 and 3.2.6.

3.3 Terms defined in ITU-T Rec. X.902 | ISO/IEC 10746-2, *Information technology - Open Systems Interconnection - Data Management and Open Distributed Processing - Basic reference model of open distributed processing: Descriptive model*

The following terms are defined in ITU-T Rec. X.902 | ISO/IEC 10746-2, and are included here for convenience.

3.3.1 Interchange reference point

A reference point at which an external physical storage medium can be introduced into the IT system.

3.3.2 Interworking reference point

A reference point at which an interface can be established to allow communications between two or more systems.

3.3.3 Perceptual reference point

A reference point at which there is some interaction between the system and the physical world.

3.3.4 Programmatic reference point

A reference point at which a programmatic interface can be established to allow access to a function.

NOTE -See 6.1 for interpretive discussion of the terms defined in 3.3.1, 3.3.2, 3.3.3 and 3.3.4.

4 Abbreviations

AEP	Application Environment Profile
API	Application Program Interface
CSI	Communications Services Interface
DIS	Draft International Standard
DTR	Draft Technical Report
EDI	Electronic Data Interchange
HCI	Human/Computer Interface

ISI	Information Services Interface
ISP	International Standardized Profile
IT	Information Technology
OSE	Open System Environment
OSI	Open Systems Interconnection

5 OSE Objectives

The user perspective of OSE originates from the position that OSE provides what is necessary for the users to access the technology necessary to achieve their desired results. The provider perspective originates from the position that the OSE provides what is necessary for producers to deliver technology to users in the most efficient and effective manner.

The following objectives, drawn from ISO/IEC TR 14252, *Guide to the POSIX Open System Environment (OSE)*, are key in establishing an open system. The descriptions of these objectives introduce a number of concepts that are required both to state clearly the objectives and to define the standards and profiles required to satisfy them. These objectives, which are not exhaustive, are as follows:

- **Application Software Portability and Software Reuse at the Source Code Level**

A comprehensive and consistent set of OSE specifications at the source code level is necessary to enable porting of software among application platform implementations. This allows an organization to protect its investment in existing software by avoiding the cost of software reimplementations.

Application Portability is often associated with porting an entire application at one time. **Software reuse** is a term used to describe porting only a subset of a working program into a new application. The new application may or may not be executed on the same application platform. Software reuse is an important element in achieving the benefits of application portability.

Portability and reuse of representations other than source code representation is a secondary objective.

- **Data Portability**

OSE standards should support portability of data stored on external media. This capability should allow existing data to be moved to a new application platform, and may be used to exchange data or for back-up.

- **Application Software Interoperability**

OSE standards and profiles should define communications services and format specifications that enable two software entities to exchange and make mutual use of data. These specifications should provide for situations where the communicating entities are running on the same or different platforms.

- **Management and Security Interoperability**

OSE specifications of application platforms should allow interoperability for management and security purposes among platform implementations.

- **User Portability**

OSE standards and profiles should enable people to interact with a wide range of application platform implementations without retraining. Variations in interaction methods which are not based on functional differences or special requirements are counter-productive and should be avoided by specifying common user-interface specifications.

- **Accommodation of Standards**

OSE profiles should promote the use of existing standards, and should accommodate imminent and new information technology standards as they become available. OSE profiles should evolve as standards emerge and as the technology and requirements change.

- **Accommodation of New Information System Technology**

OSE standards should be decoupled as much as possible from underlying technology, nevertheless, major changes in technology may require new standards or new versions of existing standards, and this must be recognised

in selecting standards and profiles. This leads to the understanding that an element of judgement is involved in selecting among base standards, and the timing of switching from an older technology to a newer one.

- **Application Platform Scalability**

Where similar services are required and provided on different types of application platforms (for example, workstations and supercomputers) the same OSE standards and profiles should be applied to each if possible.

- **Distributed System Scalability**

OSE standards and profiles should avoid specifying characteristics that limit the number and variety of application platform types that can be included in any large distributed system.

- **Implementation Transparency**

The OSE standards and profiles should be defined in such a way as to hide the mechanism used to implement the service. The complexity of the implementation is hidden from the service user behind the service interface, and is therefore "transparent" to the user. From the application software perspective, this reduces the size and cost of the application program, and is the basis for technology migration.

- **Support Clear Statement of User Requirements**

A clear identification of the specific user requirements satisfied by a profile serves to guide and focus the development of a profile, and to apply it appropriately. Profile production is an extremely expensive process. With limited resource available for development and evolution of OSE standards, this allows the standards community to focus on activities which are most useful.

6 Open System Environment Profile Concepts

OSE profiles are specified in order to fulfil the objectives identified in clause 5. OSE profiles, and their general characteristics, follow the generic descriptions given in accordance with the purpose and concept of profiles defined in

ISO/IEC TR 10000-1, and are not repeated in this Part.

6.1 General Principles

An OSE profile is a set of one or more base standards and/or ISPs' and, where applicable, the identification of chosen classes, conforming subsets, options and parameters of those base standards and/or ISPs. It specifies a part, or all, of the behaviour of an IT system at one or more OSE interfaces with respect to a function, or set of functions, that an IT system supports.

In the context of OSE profiling, an interface is a boundary of an IT system at which its behaviour can be observed. There are four distinct types of OSE interface:

- Application Program Interface (API)
- Human/Computer Interface (HCI)
- Information Services Interface (ISI)
- Communication Service Interface (CSI)

These interfaces are defined in ISO/IEC TR 14252, *Guide to the POSIX Open System Environment (OSE)*. In the context of this technical report these definitions are interpreted in an architecturally neutral sense. Thus the term Application Program Interface is interpreted as an interface between application software and a provider of appropriate services. The term Human/Computer Interface is interpreted as an interface across which physical interaction between a human being and an IT system takes place. The term Information Services Interface is interpreted as an interface across which external, persistent storage is provided, where only the format and syntax are required to be specified for data portability and interoperability. The term Communication Services Interface is interpreted as an interface that provides access to services for interaction between entities in an IT system and entities in an external system. These latter entities include external data transport facilities and devices. For CSIs, compatible data formats and protocols are necessary for interoperability.

Note: As a consequence of this interpretation, a standard for a programmatic interface between for example a transaction manager and a database manager would specify an API and be appropriate for reference from an ISP.

Furthermore, the four types of OSE interface can be interpreted as corresponding to the programmatic, perceptual, interchange and interworking reference points identified in ITU-T

Rec. X.902 | ISO/IEC 10746-2. Correspondence in this case means that a standard identified as applicable at a given OSE interface will be applicable at the corresponding ODP reference point.

The behaviour specified by an OSE profile at an interface of an IT system is a function or set of functions provided by that interface. The behaviour related to the same function as seen at different interfaces must be consistent. It follows that, where an OSE profile specifies behavior at more than one interface of an IT system, the behavior is consistent between the interfaces with respect to any of the functions concerned.

OSE profile specifications can:

- refer only to a single base standard and specify choices of options etc.;
- refer to combinations of base standards;
- refer to combinations of base standards and ISPs that specify other OSE profiles.

Reference to an ISP in an OSE profile specification can be used to ensure consistent specification of the same functionality or related functionalities in different OSE profiles. In particular, abstract specifications of data formats in profiles for Interchange Format and Presentation (F-profiles) may be applied at any OSE interface and are not restricted to CSI interfaces, as might be inferred from the fact that they are currently documented in TR 10000-2. However, a specific data format representation normally relates to a particular type of interface.

6.2 Conformance to an OSE Profile

The general concepts of the meaning of conformance to a profile, as stated in ISO/IEC TR 10000-1, apply to OSE profiles. The specification of conformance requirements and conformance tests for a given OSE profile will depend upon the different interface types relevant to the profile.

Conformance requirements and conformance tests relevant to APIs shall use the concepts and terminology defined in ISO/IEC 13210.

Conformance requirements and conformance tests relevant to CSIs shall use the concepts and terminology defined in ISO/IEC 9646-1.

There are no International Standards that provide a conformance testing methodology

generally applicable to HCIs or ISIs. Thus, conformance requirements and conformance tests relevant to HCIs and ISIs should use concepts and terminology similar to those defined in ISO/IEC 13210-1 and ISO/IEC 9646-1.

Where relevant, they should also use the concepts and terminology defined for Open Document Architecture (ODA) standards in ISO/IEC TR 10183-1 and for graphics standards in ISO/IEC 10641.

A unified approach to conformance which addresses the whole scope of OSE Profiling is an issue which requires further study. A full integration of ISO/IEC DIS 13210 and ISO/IEC 9646-1 would be a significant step in this direction.

7 Taxonomy of OSE Profiles

7.1 Nature and Purpose of the Taxonomy

It is the objective of the OSE taxonomy to provide a classification scheme that can categorize any profile. In order to achieve this objective, the classification scheme is based on main subdivisions that correspond to functions or groups of functions that are chosen by agreement in order to match the types of use to which the resulting profiles are put by both suppliers and users. These subdivisions are identified by a short character string (root mnemonic). Examples might be: Electronic Data Interchange (EDI) for basic EDI related profiles and MED for profiles specific to the medical area. Although it is desirable to keep identifiers short, no absolute length restriction is imposed.

Further levels of classification are identified by a numeric string following the root mnemonic, corresponding to agreed real world subdivisions of the area of concern. There are no general rules for the significance to be attached to the values of the numeric string. Such rules may be defined within specific areas of concern.

In order to indicate that a profile is concerned with a particular interface or set of interfaces, there is a one to four character suffix separated from the numeric string by a hyphen. The suffix is composed from the letters C, H, I and P (in alphabetical order) to identify the type(s) of interface specified in the OSE profile as follows:

C - CSI

H - HCI