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Industrial automation systems and integration — Product data representation and exchange —

Part 24: Implementation methods: C language binding of standard data access interface

Systèmes d'automatisation industrielle et intégration — Représentation et échange de données de produits —

Partie 24: Méthode de mise en application: Liant de langage C à l'interface d'accès aux données normalisées

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10303-24 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This International Standard is organized as a series of parts, each published separately. The structure of this International Standard is described in ISO 10303-1.

Each part of this International Standard is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, and application modules. This part is a member of the implementation methods series.

A complete list of parts of ISO 10303 is available from the Internet:

`<http://www.nist.gov/sc4/editing/step/titles/>`

Annex A forms a normative part of this part of ISO 10303. Annex B is for information only.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases, and as a basis for archiving.

This part of ISO 10303 specifies a C programming language late binding of capability specified in ISO 10303-22, the standard data access interface (SDAI). The SDAI defines a data access interface to data defined using ISO 10303-11 (EXPRESS). The SDAI specifies operations that give the application programmer the capability to manipulate data through an interface based upon its description in the defining schema or schemas. This part of ISO 10303 specifies manifestation of that interface in the C programming language that is independent of the EXPRESS data definitions being manipulated. The standardization of a data access interface along with data definitions facilitates integration of different software components from different vendors.

The document is structured corresponding to ISO 10303-22. The major subdivisions in this part of ISO 10303 are:

— Clause 4 is an overview of the C language late binding to the SDAI. It specifies the requirements common to all C language late binding functions.

— Clause 5 specifies the C language late bindings to the EXPRESS and binding specific constants and data types.

— Clause 6 specifies the C language late binding functions to the SDAI operations to handle the programming environment.

— The specification of the C language late binding functions for the SDAI operations follows the categories defined in ISO 10303-22 clause 10.

Computer application systems are implemented using computing languages. Since there are many computing languages, many SDAI language bindings are possible. Additional SDAI language bindings are specified as other parts of ISO 10303 within the implementation method series.

Implementations of this part of ISO 10303 are not required to support the complete set of capabilities specified in ISO 10303-22. Specific sets of capability are grouped into implementation classes. The implementation classes against which conformance may be claimed are defined in ISO 10303-22 clause 13.

Industrial automation systems and integration — Product data representation and exchange — Part 24: Implementation methods: C language binding of standard data access interface

1 Scope

This part of ISO 10303 specifies a C programming language late binding of the capability specified in ISO 10303-22 - Standard data access interface (SDAI). This binding is a late binding and as such, none of the constants, data types, and functions depend on the application schema being accessed.

The following are within the scope of this part of ISO 10303:

— access to and manipulation of data types and entities which are specified in ISO 10303-22;

— convenience functions suitable to this language binding;

— late binding requirements specified in ISO 10303-22.

The following are outside the scope of this part of ISO 10303:

— memory arrangement of data structures used by implementations of this part of ISO 10303;

— early binding requirements as specified in ISO 10303-22;

— all items listed as out of scope in ISO 10303-22.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10303 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 9899:1999, *Programming languages — C*

ISO/IEC 8824-1:1998, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO 10303-1:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 1: Overview and fundamental principles*

ISO 10303-11:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual*

ISO 10303-21:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 21: Implementation methods: Clear text encoding of the exchange structure*

ISO 10303-22:1998, *Industrial automation systems and integration - Product data representation and exchange - Part 22: Implementation methods: Standard data access interface*

3 Terms, definitions, and abbreviations

3.1 Terms defined in ISO 10303-1

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-1 apply.

— application;

— application protocol;

— conformance testing;

— data;

— implementation method;

— information;

— model.

3.2 Terms defined in ISO 10303-11

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-11 apply.

— complex entity data type;

— data type;

— entity;

— entity data type;

— entity instance;

— instance.

3.3 Terms defined in ISO 10303-22

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-22 apply.

— application schema;

— constraint;

— identifier;

— iterator;

— implementation class;

— repository;

— schema instance;

— SDAI language binding;

— SDAI-model;

— session;

— validation.

3.4 Other definitions

For the purposes of this part of ISO 10303, the following definitions apply:

3.4.1
attribute data block
a C structure containing both a value and the data type of the value that is accessed through a handle.

3.4.2
function
a C language late binding specific interpretation of an SDAI operation, a combination of several SDAI operations or an operation unique to this binding.

3.4.3
function prototype
the definition of a C programming language function in an include file.

3.4.4
handle C type
a function parameter that is a C language pointer type containing the address of a datum or a structured data.

3.5 Abbreviations

For the purposes this part of ISO 10303, the following abbreviations apply:

aggr	Aggregate
app	Application
attr	Attribute
ADB	Attribute Data Block
BN	By name
Deq	Domain equivalent
Enum	Enumeration
Id	Identifier
Itr	Iterator
NPL	Non-persistent List
Rep	Repository
RO	Read only
RW	Read write
SDAI	Standard Data Access Interface
Trx	Transaction
Uni	Uniqueness

