
**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*

ISO 10303-24:2001

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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Contents	page
1 Scope	1
2 Normative references	1
3 Terms, definitions, and abbreviations	2
3.1 Terms defined in ISO 10303-1	2
3.2 Terms defined in ISO 10303-11	2
3.3 Terms defined in ISO 10303-22	3
3.4 Other definitions	3
3.5 Abbreviations	4
4 Overview of the C language late binding of SDAI	5
4.1 Language bindings	5
4.2 Conformance	5
4.3 Use of late binding functions	5
4.3.1 Invalid parameter values	5
4.3.2 Error handling	5
4.3.3 Memory management	5
4.3.4 The SDAI header file	6
4.3.5 Macros	6
4.4 Naming and typographical conventions	6
5 Constants and data type definitions	7
5.1 Standard error codes	7
5.2 EXPRESS constants	7
5.3 EXPRESS data types	7
5.3.1 Bit data type	7
5.3.2 EXPRESS simple data types	8
5.3.3 Enumeration data type	9
5.3.4 Select data type	9
5.3.5 Entity data type	10
5.3.6 Aggregate data types	10
5.4 SDAI data types	10
5.4.1 SDAI primitive data types	10
5.4.2 SDAI entity data types	11
5.4.3 Iterator data type	13
5.4.4 Non-persistent list data type	13
5.4.5 Query source data type	13
5.4.6 SDAI access type data type	13
5.5 C late binding-specific data types	13
5.5.1 Attribute data block data type	14
5.5.2 Aggregate index data type	14
5.5.3 Error code data type	14
5.5.4 Error handler data type	14
5.5.5 Transaction commit mode data type	15
5.5.6 NULL identifier data type	15

ISO 10303-24:2001(E)

6	C late binding functions of the SDAI operations	15
6.1	Environment operations	16
6.1.1	Open session	16
6.1.2	C late binding specific arithmetic operations	16
6.1.3	C late binding specific error handling operations	17
6.1.4	C late binding specific instance operations	18
6.2	Session operations	19
6.2.1	Record event	19
6.2.2	Set event recording	19
6.2.3	Close session	20
6.2.4	Open repository	20
6.2.5	Start transaction read-write or read-only access	21
6.2.6	Break transaction	22
6.2.7	End transaction access	22
6.2.8	Create non-persistent list	23
6.2.9	Delete non-persistent list	23
6.2.10	SDAI query	24
6.2.11	C late binding specific recording operations	25
6.2.12	C late binding specific attribute data block operations	26
6.3	Repository operations	29
6.3.1	Create SDAI-model	29
6.3.2	Create schema instance	30
6.3.3	Close repository	31
6.4	Schema instance operations	31
6.4.1	Delete schema instance	31
6.4.2	Rename schema instance	32
6.4.3	Add SDAI-model	33
6.4.4	Remove SDAI-model	34
6.4.5	Validate global rule	34
6.4.6	Validate uniqueness rule	35
6.4.7	Validate instance reference domain	36
6.4.8	Validate schema instance	37
6.4.9	Is validation current	38
6.4.10	Schema instance operations for convenience	39
6.5	SDAI-model operations	40
6.5.1	Delete SDAI-model	40
6.5.2	Rename SDAI-model	41
6.5.3	Start SDAI-model access	42
6.5.4	Promote SDAI-model to read-write access	42
6.5.5	End SDAI-model access	43
6.5.6	Get entity definition	44
6.5.7	Create entity instance	44
6.5.8	Undo changes	45
6.5.9	Save changes	46
6.5.10	SDAI-model operations for convenience	46
6.6	Scope operations	48
6.6.1	Add to scope	48
6.6.2	Is scope owner	49
6.6.3	Get scope	49

6.6.4	Remove from scope	50
6.6.5	Add to export list	51
6.6.6	Remove from export list	51
6.6.7	Scoped delete	52
6.6.8	Scoped copy in same SDAI-model	53
6.6.9	Scoped copy to other SDAI-model	53
6.6.10	Validate scope reference restrictions	54
6.6.11	Scope operations for convenience	55
6.7	Type operations	57
6.7.1	Get complex entity definition	57
6.7.2	Is subtype of	58
6.7.3	Is SDAI subtype of	59
6.7.4	Is domain equivalent with	59
6.7.5	Type operations for convenience	60
6.8	Entity instance operations	61
6.8.1	Get attribute	61
6.8.2	Test attribute	62
6.8.3	Find entity instance SDAI-model	63
6.8.4	Get instance type	64
6.8.5	Is instance of	64
6.8.6	Is kind of	65
6.8.7	Is SDAI kind of	66
6.8.8	Find entity instance users	67
6.8.9	Find entity instance used in	68
6.8.10	Get attribute value bound	69
6.8.11	Find instance roles	70
6.8.12	Find instance data types	70
6.8.13	Entity instance operations for convenience	71
6.9	Application instance operations	73
6.9.1	Copy application instance in same SDAI-model	73
6.9.2	Copy application instance to other SDAI-model	74
6.9.3	Delete application instance	75
6.9.4	Put attribute	75
6.9.5	Unset attribute value	76
6.9.6	Create aggregate instance	77
6.9.7	Create aggregate instance ADB	78
6.9.8	Get persistent label	79
6.9.9	Get session identifier	80
6.9.10	Get description	80
6.9.11	Validate where rule	81
6.9.12	Validate required explicit attributes assigned	82
6.9.13	Validate inverse attributes	83
6.9.14	Validate explicit attributes references	84
6.9.15	Validate aggregates size	85
6.9.16	Validate aggregates uniqueness	85
6.9.17	Validate array not optional	86
6.9.18	Validate string width	87
6.9.19	Validate binary width	88
6.9.20	Validate real precision	89

6.9.21	Application instance operations for convenience	90
6.10	Entity instance aggregate operations	91
6.10.1	Get member count	91
6.10.2	Is member	92
6.10.3	Create iterator	93
6.10.4	Delete iterator	94
6.10.5	Beginning	94
6.10.6	Next	95
6.10.7	Get current member	95
6.10.8	Get value bound by iterator	96
6.10.9	Get lower bound	97
6.10.10	Get upper bound	98
6.11	Application instance aggregate operations	99
6.11.1	Create aggregate instance as current member	99
6.11.2	Put current member	100
6.11.3	Remove current member	100
6.12	Application instance unordered collection operations	101
6.12.1	Add unordered	101
6.12.2	Create aggregate instance unordered	102
6.12.3	Remove unordered	103
6.13	Entity instance ordered collection operations	104
6.13.1	Get by index	104
6.13.2	End	105
6.13.3	Previous	105
6.13.4	Get value bound by index	106
6.14	Application instance ordered collection operations	107
6.14.1	Put by index	107
6.14.2	Create aggregate instance by index	108
6.15	Entity instance array operations	109
6.15.1	Test by index	109
6.15.2	Test current member	109
6.15.3	Get lower index	110
6.15.4	Get upper index	111
6.16	Application instance array operations	112
6.16.1	Unset value by index	112
6.16.2	Unset value current member	112
6.16.3	Reindex array	113
6.16.4	Reset array index	114
6.17	Application instance list operations	114
6.17.1	Add before current member	114
6.17.2	Add after current member	115
6.17.3	Add by index	116
6.17.4	Create aggregate instance before current member	117
6.17.5	Create aggregate instance after current member	118
6.17.6	Add aggregate instance by index	119
6.17.7	Remove by index	120
6.18	C late binding specific SELECT TYPE operations	120
6.18.1	Put ADB type path	121
6.18.2	Get ADB type path	121

6.18.3 Validate type path 122

Annex A (normative) Information object registration 124

Annex B (informative) The C late binding header include file <sdai.h> 125

Index 135

Tables	page
Table 1 - SDAI C late binding error indicators	7
Table 2 - EXPRESS built-in constants	8
Table 3 - SDAI primitive data types mapped to C late binding	11
Table 4 - SDAI entity data types mapped to C late binding	12

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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 10303-24:2001(E)

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.

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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.

ISO 10303-24:2001(E)

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