



Geographic information—Conceptual schema language

STANDARDS
Australia



Currently in preview, click buy full version

AS ISO 19103:2018

This Australian Standard® was prepared by IT-004, Geographical Information/Geomatics. It was approved on behalf of the Council of Standards Australia on 5 June 2018.

This Standard was published on 29 June 2018.

The following are represented on Committee IT-004:

ANZLIC—the Spatial Information Council
Australian Antarctic Division, Department of the Environment
(Australian Government)
Australian Bureau of Statistics
Australian Hydrographic Office
Bureau of Meteorology (Australian Government)
CSIRO
Curtin University of Technology
Department of Defence (Australian Government)
Department of Human Services (Australian Government)
Geoscience Australia
InterGovernmental Committee on Surveying and Mapping
Spatial Industries Business Association

This Standard was issued in draft form for comment as DR AS/NZS ISO 19103:2018.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

www.saiglobal.com (sales and distribution)

ISBN 978 1 76072 094 0



Geographic information—Conceptual schema language

First published as AS/NZS ISO 19103:2006.
Revised and redesignated as AS ISO 19103:2018.

COPYRIGHT

© ISO 2018 — All rights reserved
© Standards Australia Limited 2018

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

Published by SAI Global Pty Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001.

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee IT-004, Geographical Information/Geomatics, to supersede AS/NZS ISO 19103:2006.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide rules and guidelines for the use of a conceptual schema language within the context of geographic information. The chosen conceptual schema language is the Unified Modelling Language (UML). This Standard also provides a profile of the Unified Modelling Language (UML).

This Standard is identical with, and has been reproduced from, ISO 19103:2015, *Geographic information — Conceptual schema language*.

As this document has been reproduced from an International Standard, the following applies:

- (a) In the source text 'this International Standard' should read 'this Australian Standard'.
- (b) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms 'normative' and 'informative' are used in Standards to define the application of the appendices or annexes to which they apply. A 'normative' appendix or annex is an integral part of a Standard, whereas an 'informative' appendix or annex is only for information and guidance.

Contents

Preface	ii
Foreword	v
Introduction	vi
1 Scope	1
2 Conformance	1
2.1 Introduction	1
2.2 UML version conformance	1
2.2.1 UML 2 conformance class	1
2.2.2 UML 1 to UML2 mapping conformance class	1
2.2.3 Conformant schema conformance class	2
2.3 Data types conformance	2
2.3.1 Introduction	2
2.3.2 Core types conformance class	2
2.3.3 Core and extension types conformance class	2
2.4 Model documentation conformance	3
2.4.1 Introduction	3
2.4.2 Model documentation conformance class	3
3 Normative references	3
4 Terms and definitions	4
5 Presentation and abbreviations	8
5.1 Presentation	8
5.2 Backwards compatibility to previous version of ISO 19103	8
5.3 Abbreviations	9
6 The ISO 19103 UML Profile – Use of UML	9
6.1 Introduction	9
6.2 General use of UML	10
6.3 Classifiers	10
6.4 Attributes	11
6.5 Enumerations and code lists	11
6.5.1 General rules	11
6.5.2 Enumerations	11
6.5.3 Code lists	12
6.6 Data types	13
6.7 Operations	13
6.8 Relationships	13
6.8.1 General	13
6.8.2 Associations	13
6.8.3 Generalizations	14
6.8.4 Realizations	15
6.9 Services	16
6.10 Stereotypes and keywords	16
6.10.1 Introduction	16
6.10.2 Stereotypes and keywords	16
6.11 Optional, conditional and mandatory attributes and association ends	17
6.11.1 Mandatory	17
6.11.2 Optional	17
6.11.3 Conditional	17
6.12 Naming and namespaces	17
6.13 Packages	18
6.14 Notes	19
6.15 Constraints	19
6.16 Documentation of models	20

7	Core data types	20
7.1	Introduction	20
7.2	Primitive types	21
7.2.1	General	21
7.2.2	Date	22
7.2.3	Time	22
7.2.4	DateTime	22
7.2.5	Number	22
7.2.6	Decimal	24
7.2.7	Integer	25
7.2.8	Real	25
7.2.9	Vector	25
7.2.10	CharacterString	26
7.2.11	Boolean	27
7.3	Collections	28
7.3.1	General	28
7.3.2	Collection templates	29
7.3.3	Set	29
7.3.4	Bag	29
7.3.5	Sequence	29
7.4	Enumerated types	30
7.4.1	General	30
7.4.2	Bit	30
7.4.3	Digit	31
7.4.4	Sign	31
7.5	Name types	31
7.5.1	General	31
7.5.2	Namespace	32
7.5.3	GenericName	33
7.5.4	ScopedName	34
7.5.5	LocalName	34
7.5.6	TypeName	35
7.5.7	MemberName	35
7.6	Any type	36
7.7	Record types	36
7.7.1	General	36
7.7.2	Record	36
7.7.3	RecordType	37
7.7.4	Field	37
7.7.5	FieldType	37
7.8	NULL and EMPTY values	37
Annex A	(normative) Abstract test suite	38
Annex B	(normative) Rules for mapping UML 1 models to UML 2 models	40
Annex C	(normative) Data types – extension types	41
Annex D	(normative) Formal UML profile	48
Annex E	(informative) On conceptual schema languages	50
Annex F	(informative) Modelling guidelines	58
Annex G	(informative) Introduction to UML	67
Annex H	(informative) Backwards compatibility	79
	Bibliography	81

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics*.

This first edition of ISO 19103:2015 cancels and replaces the first edition (ISO/TS 19103:2005).

Introduction

This International Standard of the ISO geographic information suite of standards is concerned with the adoption and use of a conceptual schema language (CSL) for developing computer interpretable models, or schemas, of geographic information. Standardization of geographic information requires the use of a formal CSL to specify unambiguous schemas that can serve as a basis for data interchange and the definition of interoperable services. An important goal of the ISO geographic information suite of standards is to create a framework in which data interchange and service interoperability can be realized across multiple implementation environments. The adoption and consistent use of a CSL to specify geographic information is of fundamental importance in achieving this goal.

There are two aspects to this International Standard. First, a CSL is selected that meets the requirements for rigorous representation of geographic information. This International Standard identifies the combination of the Unified Modeling Language (UML) static structure diagram with its associated Object Constraint Language (OCL) and a set of basic type definitions as the conceptual schema language for specification of geographic information. Secondly, this International Standard provides guidelines on how UML should be used to create geographic information models that are a basis for achieving the goal of interoperability.

One goal of the ISO geographic information suite of standards using UML models is that they will provide a basis for model based mapping to encoding schemas like the ones defined in ISO 19118, as well as a basis for creating implementation specifications for implementation profiles for various other environments.

This International Standard describes the general metamodel for use of UML in the context of the ISO geographic information series of standards. Aspects specifically dealing with the modelling of application schemas are described in ISO 19109.

This International Standard is a revision of a previous version from 2005. Changes are documented in [Clause 5](#).

Australian Standard[®]

Geographic information—Conceptual schema language

1 Scope

This International Standard provides rules and guidelines for the use of a conceptual schema language within the context of geographic information. The chosen conceptual schema language is the Unified Modeling Language (UML).

This International Standard provides a profile of the Unified Modelling Language (UML).

The standardization target type of this standard is UML schemas describing geographic information.

2 Conformance

2.1 Introduction

This International Standard defines three levels of conformance classes:

- UML version
- Data types
- Model documentation

To conform to this International Standard, the usage of a conceptual schema language shall satisfy all of the requirements specified in one of the three levels of conformance described below, with the corresponding abstract test suite in [Annex A](#).

2.2 UML version conformance

2.2.1 UML 2 conformance class

[Table 1](#) describes the conformance class for UML 2.

Table 1 — UML 2 conformance class

Conformance class identifier	UML2
Standardization target type	UML2 schemas for geographic information
Dependency	ISO/IEC 19505-2:2012, Clause 2 OCL 2.3.1
Requirements	All requirements in 6.2 to 6.12 except Requirement 2, and including Requirement 26.
Tests	All tests in A.1.2

2.2.2 UML 1 to UML2 mapping conformance class

[Table 2](#) describes the conformance class for mapping from UML 1.

Table 2 — UML 1 to UML 2 mapping conformance class

Conformance class identifier	UML1
Standardization target type	UML1 schemas for geographic information