
**Information technology — General-
Purpose Datatypes (GPD)**

Technologies de l'information — Types de données

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/IEC 11404:2007](https://standards.iteh.ai/catalog/standards/sist/0bf1626f-9d7d-4b8a-a863-5bcfd7df31/iso-iec-11404-2007)

<https://standards.iteh.ai/catalog/standards/sist/0bf1626f-9d7d-4b8a-a863-5bcfd7df31/iso-iec-11404-2007>

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 11404:2007

<https://standards.iteh.ai/catalog/standards/sist/0bf1626f-9d7d-4b8a-a863-5bcfd7df31/iso-iec-11404-2007>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

Contents

Page

Foreword.....	vi
0 Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Conformance	8
4.1 Direct conformance	8
4.2 Indirect conformance	9
4.3 Conformance of a mapping standard	9
4.4 GPD program conformance	10
5 Conventions used in this International Standard	10
5.1 Formal syntax	10
5.2 Text conventions	11
6 Fundamental notions	11
6.1 Datatype	11
6.2 Value space	12
6.3 Datatype properties	12
6.3.1 Equality	13
6.3.2 Order	13
6.3.3 Bound	13
6.3.4 Cardinality	14
6.3.5 Exact and approximate	14
6.3.6 Numeric	14
6.4 Primitive and non-primitive datatypes	15
6.5 Datatype generator	15
6.6 Characterizing operations	15
6.7 Datatype families	16
6.8 Aggregate datatypes	17
6.8.1 Homogeneity	17
6.8.2 Size	17
6.8.3 Uniqueness	17
6.8.4 Aggregate-imposed identifier uniqueness	18
6.8.5 Aggregate-imposed ordering	18
6.8.6 Access method	18
6.8.7 Recursive structure	19
6.8.8 Structured and unstructured	19
6.8.9 Mandatory and optional components	19
6.9 Provisions associated with datatypes	19
7 Elements of the Datatype Specification Language	21
7.1 IDN character-set	21
7.2 Whitespace	22
7.3 Lexical objects	23
7.3.1 Identifiers	23
7.3.2 Digit-string	23
7.3.3 Character-literal and string-literal	23
7.3.4 Keywords	24
7.4 Annotations	24
7.5 Values	25

7.5.1	Independent values	25
7.5.2	Dependent values	26
7.6	GPD program text	27
8	Datatypes	27
8.1	Primitive datatypes	28
8.1.1	Boolean	29
8.1.2	State	30
8.1.3	Enumerated	31
8.1.4	Character	32
8.1.5	Ordinal	33
8.1.6	Date-and-Time	34
8.1.7	Integer	35
8.1.8	Rational	36
8.1.9	Scaled	37
8.1.10	Real	38
8.1.11	Complex	40
8.1.12	Void	41
8.2	Subtypes and extended types	42
8.2.1	Range	43
8.2.2	Selecting	43
8.2.3	Excluding	44
8.2.4	Size	44
8.2.5	Explicit subtypes	45
8.2.6	Extended	45
8.3	Generated datatypes	46
8.3.1	Choice	47
8.3.2	Pointer	49
8.3.3	Procedure	50
8.4	Aggregate Datatypes	53
8.4.1	Record	55
8.4.2	Class	56
8.4.3	Set	58
8.4.4	Bag	59
8.4.5	Sequence	60
8.4.6	Array	61
8.4.7	Table	64
8.5	Defined datatypes	66
8.6	Provisions	66
8.6.1	General parameters for provisions	67
8.6.2	Aggregate-specific features	70
8.6.3	Aggregate-component-identifier uniqueness	70
8.6.4	Usage-specific features	71
9	Declarations	72
9.1	Type declarations	72
9.1.1	Renaming declarations	73
9.1.2	New datatype declarations	73
9.1.3	New generator declarations	73
9.2	Value declarations	73
9.3	Termination declarations	74
9.4	Normative datatype declarations	74
9.5	Lexical operations	74
9.5.1	Import	74
9.5.2	Macro	75
10	Defined datatypes and generators	75
10.1	Defined datatypes	75
10.1.1	Natural number	76
10.1.2	Modulo	76
10.1.3	Bit	77

ITeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/IEC 11404:2007](https://standards.iteh.ai/catalog/standards/sist/0bf0620f-9d7d-4b8a-a863-3bc6fd7df51/iso-iec-11404-2007)

[https://standards.iteh.ai/catalog/standards/sist/0bf0620f-9d7d-4b8a-a863-](https://standards.iteh.ai/catalog/standards/sist/0bf0620f-9d7d-4b8a-a863-3bc6fd7df51/iso-iec-11404-2007)

[3bc6fd7df51/iso-iec-11404-2007](https://standards.iteh.ai/catalog/standards/sist/0bf0620f-9d7d-4b8a-a863-3bc6fd7df51/iso-iec-11404-2007)

10.1.4	Bit string	77
10.1.5	Character string	77
10.1.6	Time interval	79
10.1.7	Octet	79
10.1.8	Octet string	79
10.1.9	Private	80
10.1.10	Object identifier	80
10.2	Defined generators	82
10.2.1	Stack	82
10.2.2	Tree	83
10.2.3	Optional	83
11	Mappings	84
11.1	Outward Mappings	85
11.2	Inward Mappings	86
11.3	Reverse Inward Mapping	87
11.4	Support of Datatypes	87
11.4.1	Support of equality	87
11.4.2	Support of order	88
11.4.3	Support of bounds	88
11.4.4	Support of cardinality	88
11.4.5	Support for the exact or approximate property	88
11.4.6	Support for the numeric property	88
11.4.7	Support for the mandatory components	88
Annex A	(informative) Character-set standards	89
Annex B	(informative) Recommendation for the placement of annotations	91
Annex C	(informative) Implementation notions of datatypes	93
Bibliography	96

[ISO/IEC 11404:2007](https://standards.iteh.ai/catalog/standards/sist/0bfl626f-9d7d-4b8a-a863-5bcfcfd7df31/iso-iec-11404-2007)

<https://standards.iteh.ai/catalog/standards/sist/0bfl626f-9d7d-4b8a-a863-5bcfcfd7df31/iso-iec-11404-2007>

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

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

ISO/IEC 11404 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 22, *Programming languages, their environments and system software interfaces*.

This second edition cancels and replaces the first edition (ISO/IEC 11404:1996), which has been technically revised.

[ISO/IEC 11404:2007](https://standards.iteh.ai/catalog/standards/sist/0bfl626f-9d7d-4b8a-a863-5bcfd7df31/iso-iec-11404-2007)

<https://standards.iteh.ai/catalog/standards/sist/0bfl626f-9d7d-4b8a-a863-5bcfd7df31/iso-iec-11404-2007>

0 Introduction

0.1 Introduction to the second edition

This second edition of ISO/IEC 11404 incorporates recent technologies and improvements since the first edition (ISO/IEC 11404:1996). The following improvements have been incorporated into the second edition.

- *Title change to reflect actual usage*. The use of ISO/IEC 11404 is no longer simply a tool for communicating among programming languages (old title: *Language-independent datatypes*). ISO/IEC 11404 is used for formal description of conceptual datatypes in binding (or binding-independent) standards and used as formalization of metadata for data elements, data element concepts, and value domains (see ISO/IEC 11179-3). The old title was potentially misleading because readers might believe that ISO/IEC 11404 is only useful for programming languages. The new title, *General-Purpose Datatypes* captures the essence of ISO/IEC 11404 and its use.
- *Incorporation of latest technologies*. Provide enhancements to the use of ISO/IEC 11404 as a datatype nomenclature reference for current programming languages, interface languages and data representation languages, specifically Java, IDL, Express, and XML.
- *Support for semi-structured and unstructured data aggregates*. Semi-structured data and unstructured data includes aggregates where datatyping and navigation may be unknown or unspecified in advance. For example, some systems permit “discovery” (or “introspection”) of data. In some cases, the datatype may be unknown in advance (e.g. at compilation time), but may be discovered and processed at runtime (e.g. via datatype libraries or metadata registries).
- *Support for data longevity, versioning, and migration*. There is a need to support, from a datatyping perspective, obsolete and reserved features, such as data elements and permissible values (enumerations and states). Marking features as “obsolete” allows processing, compilation, and runtime systems to “flag” or diagnose old (deprecated) features, while still maintaining compatibility, so that it is possible to support transitions from past to present. Similarly, marking features as “reserved” allows processing, compilation, and runtime systems to “flag” or diagnose potential incompatibilities with future systems, so that it is possible to support transitions from present to future.
- *Extensibility of datatypes and value spaces*. There is a need to support some kind of extensibility concept. For example: (1) a GPD specification of an aggregate contains the elements A and B. (2) An application creates an aggregate with the elements A, B, and C. (3) Are the application’s “extensions” of the aggregate acceptable/in conformity with the GPD specification in (1)? The answer to (3) is dependent upon the intent and design of the specification in (1): in some cases extensions are permitted, in some cases extensions are not permitted. The extensibility concept would allow the user of GPD datatypes to describe the kind of extensions permitted. This feature is particularly important in (a) data conformance and (b) application runtime environments that permit “discovery” or “introspection”. This feature is available via the “provision()” capability.

Features that are not incorporated within GPD include the following:

- *Namespace capability*. Given the larger number of declarations, a namespace capability is necessary.
- *Data representation*. Although these features are a part of GPD annotations, there is no standardization of data representation in these annotations. This step is an important link for data interoperability.

0.2 Introduction to the first edition (ISO/IEC 11404:1996)

Many specifications of software services and applications libraries are, or are in the process of becoming, International Standards. The interfaces to these libraries are often described by defining the form of reference, e.g. the “procedure call”, to each of the separate functions or services in the library, as it must appear in a user program written in some standard programming language (Fortran, COBOL, Pascal, etc.). Such an interface specification is commonly referred to as the “<language> binding of <service>”, e.g. the “Fortran binding of PHIGS” (ISO/IEC 9593-1:1990, *Information processing systems — Computer graphics — Programmer’s Hierarchical Interactive Graphics System (PHIGS) language bindings — Part 1: FORTRAN*).

This approach leads directly to a situation in which the standardization of a new service library immediately requires the standardization of the interface bindings to every standard programming language whose users might reasonably be expected to use the service, and the standardization of a new programming language immediately requires the standardization of the interface binding to every standard service package which users of that language might reasonably be expected to use. To avoid this n-to-m binding problem, ISO/IEC JTC 1, *Information technology* assigned to SC 22 the task of developing an International Standard for language-independent procedure calling and a parallel International Standard for language-independent datatypes, which could be used to describe the parameters to such procedures.

This International Standard provides the specification for the language-independent datatypes. It defines a set of datatypes, independent of any particular programming language specification or implementation, that is rich enough so that any common datatype in a standard programming language or service package can be mapped to some datatype in the set.

The purpose of this International Standard is to facilitate commonality and interchange of datatype notions, at the conceptual level, among different languages and language-related entities. Each datatype specified in this International Standard has a certain basic set of properties sufficient to set it apart from the others and to facilitate identification of the corresponding (or nearest corresponding) datatype to be found in other standards. Hence, this International Standard provides a single common reference model for all standards which use the concept datatype. It is expected that each programming language standard will define a mapping from the datatypes supported by that programming language into the datatypes specified herein, semantically identifying its datatypes with datatypes of the reference model, and thereby with corresponding datatypes in other programming languages.

It is further expected that each programming language standard will define a mapping from those language-independent (LI) datatypes which that language can reasonably support into datatypes which may be specified in the programming language. At the same time, this International Standard will be used, among other applications, to define a “language-independent binding” of the parameters to the procedure calls constituting the principal elements of the standard interface to each of the standard services. The production of such service bindings and language mappings leads, in cooperation with the parallel language-independent procedure calling mechanism, to a situation in which no further “<language> binding of <service>” documents need to be produced: Each service interface, by defining its parameters using LI datatypes, effectively defines the binding of such parameters to any standard programming language; and each language, by its mapping from the LI datatypes into the language datatypes, effectively defines the binding to that language of parameters to any of the standard services.

Information technology — General-Purpose Datatypes (GPD)

1 Scope

This International Standard specifies the nomenclature and shared semantics for a collection of datatypes commonly occurring in programming languages and software interfaces, referred to as the General-Purpose Datatypes (GPD). It specifies both primitive datatypes, in the sense of being defined *ab initio* without reference to other datatypes, and non-primitive datatypes, in the sense of being wholly or partly defined in terms of other datatypes. The specification of datatypes in this International Standard is “general-purpose” in the sense that the datatypes specified are classes of datatype of which the actual datatypes used in programming languages and other entities requiring the concept “datatype” are particular instances. These datatypes are general in nature; thus, they serve a wide variety of information processing applications.

This International Standard expressly distinguishes three notions of datatype:

- the conceptual, or abstract, notion of a datatype, which characterizes the datatype by its nominal values and properties;
- the structural notion of a datatype, which characterizes the datatype as a conceptual organization of specific component datatypes with specific functionalities; and
- the implementation notion of a datatype, which characterizes the datatype by defining the rules for representation of the datatype in a given environment.

This International Standard defines the abstract notions of many commonly used primitive and non-primitive datatypes which possess the structural notion of atomicity. This International Standard does not define all atomic datatypes; it defines only those which are common in programming languages and software interfaces. This International Standard defines structural notions for the specification of other non-primitive datatypes, and provides a means by which datatypes not defined herein can be defined structurally in terms of the GPDs defined herein.

This International Standard defines a partial terminology for implementation notions of datatypes and provides for the use of this terminology in the definition of datatypes. The primary purpose of this terminology is to identify common implementation notions associated with datatypes and to distinguish them from conceptual notions.

This International Standard specifies the required elements of mappings between the GPDs and the datatypes of some other language. This International Standard does not specify the precise form of a mapping, but rather the required information content of a mapping.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO/IEC 8824 (all parts), *Information technology — Abstract Syntax Notation One (ASN.1)*

ISO/IEC 10646, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

ISO/IEC 14977, *Information technology — Syntactic metalanguage — Extended BNF*

IETF RFC 2396, *Uniform Resource Identifiers (URI): Generic Syntax*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE These definitions might not coincide with accepted mathematical or programming language definitions of the same terms.

3.1

actual parametric datatype

datatype appearing as a parametric datatype in a use of a datatype generator, in contrast to the formal-parametric-types appearing in the definition of the datatype generator

3.2

actual parametric value

value appearing as a parametric value in a reference to a datatype family or datatype generator, in contrast to the formal-parametric-values appearing in the corresponding definitions

3.3

aggregate datatype

generated datatype each of whose values is made up of values of the component datatypes, in the sense that operations on all component values are meaningful

3.4

annotation

descriptive information unit attached to a datatype, or a component of a datatype, or a procedure (value), to characterize some aspect of the representations, variables, or operations associated with values of the datatype

3.5

approximate

property of a datatype indicating that there is not a 1-to-1 relationship between values of the conceptual datatype and the values of a valid computational model of the datatype

3.6

bounded

property of a datatype, meaning both bounded above and bounded below

3.7

bounded above

property of a datatype indicating that there is a value U in the value space such that, for all values s in the value space, $s \leq U$

3.8

bounded below

property of a datatype indicating that there is a value L in the value space such that, for all values s in the value space, $s \geq L$

3.9**characterizing operations**

⟨datatype⟩¹⁾ collection of operations on, or yielding, values of the datatype that distinguish this datatype from other datatypes with identical value spaces

3.10**characterizing operations**

⟨datatype generator⟩ collection of operations on, or yielding, values of any datatype resulting from an application of the datatype generator that distinguish this datatype generator from other datatype generators and produce identical value spaces from identical parametric datatypes

3.11**component datatype**

datatype which is a parametric datatype to a datatype generator

NOTE A component datatype is a datatype on which the datatype generator operates.

3.12**datatype**

set of distinct values, characterized by properties of those values, and by operations on those values

3.13**datatype declaration**

means provided by this International Standard for the definition of a datatype which is not itself defined by this International Standard

3.14**datatype family**

collection of datatypes which have equivalent characterizing operations and relationships, but value spaces that differ in the number and identification of the individual values

3.15**datatype generator
generator**

operation on datatypes, as objects distinct from their values, that generates new datatypes

3.16**defined datatype**

datatype defined by a type-declaration

3.17**defined generator**

datatype generator defined by a type-declaration

3.18**exact**

property of a datatype indicating that every value of the conceptual datatype is distinct from all others in any valid computational model of the datatype

3.19**formal-parametric-type**

identifier, appearing in the definition of a datatype generator, for which a datatype will be substituted in any reference to a (defined) datatype resulting from the generator

1) Angle brackets indicate the subject field to which the concept belongs, in accordance with ISO 10241.

3.20

formal-parametric-value

identifier, appearing in the definition of a datatype family or datatype generator, for which a value will be substituted in any reference to a (defined) datatype in the family or resulting from the generator

3.21

general-purpose datatype

GPD

datatype defined by this International Standard

3.22

GPD-generated datatype

GPD datatype

datatype defined by the means of datatype definition provided by this International Standard

NOTE Although “GPD datatype” expands to “general-purpose datatype datatype” and might appear redundant, it is to be read as “general-purpose-datatype datatype”, where GPD is an adjective and datatype (standalone) is a noun.

3.23

generated datatype

datatype defined by the application of a datatype generator to one or more previously-defined datatypes

3.24

generated internal datatype

datatype defined by the application of a datatype generator defined in a particular programming language to one or more previously-defined internal datatypes

3.25

generator declaration

means provided by this International Standard for the definition of a datatype generator which is not itself defined by this International Standard

3.26

instruction

provision that conveys an action to be performed

[ISO/IEC Guide 2]

3.27

internal datatype

datatype whose syntax and semantics are defined by some other standard, specification, language, product, service or other information processing entity

3.28

inward mapping

conceptual association between the internal datatypes of a language and the general-purpose datatypes which assigns to each general-purpose datatype either a single semantically equivalent internal datatype or no equivalent internal datatype

3.29

lower bound

value L such that, for all values s in the value space in a datatype which is bounded below, $L \leq s$

3.30

mandatory requirement

requirement of a normative document that must necessarily be fulfilled in order to comply with that document

NOTE 1 Adapted from the definition of “exclusive requirement” in ISO/IEC Guide 2.

NOTE 2 A “mandatory requirement” is also known as an “exclusive requirement”.

3.31**mapping**

⟨datatypes⟩ formal specification of the relationship between the internal datatypes that are notions of, and specifiable in, a particular programming language and the general-purpose datatypes specified in this International Standard

3.32**mapping**

⟨values⟩ corresponding specification of the relationships between values of the internal datatypes and values of the general-purpose datatypes

3.33**meta-identifier**

name of a non-terminal symbol

[ISO/IEC 14977]

NOTE See note in 5.1 concerning the context of the specialized usage of this term for describing the syntax of ISO/IEC 11404 program text.

3.34**non-terminal symbol**

⟨EBNF⟩ syntactic part of the language being defined

[ISO/IEC 14977]

NOTE See note in 5.1 concerning the context of the specialized usage of this term.

3.35**normative datatype**

collection of specifications for datatype properties that may be simultaneously satisfied by more than one actual datatype

3.36**normative document**

document that provides rules, guidelines or characteristics for activities or their results

[ISO/IEC Guide 2]

NOTE 1 The term “normative document” is a generic term that covers such documents as standards and technical specifications.

NOTE 2 A “document” is to be understood as any medium with information recorded on or in it, such as a paper document or program code.

3.37**optional requirement**

requirement of a normative document that must be fulfilled in order to comply with a particular option permitted by that document

[ISO/IEC Guide 2]

NOTE An optional requirement may be either (1) one of two or more alternative requirements; or (2) an additional requirement that must be fulfilled only if applicable and that may otherwise be disregarded.

3.38**order**

mathematical relationship among values

NOTE See 6.3.2.

3.39

ordered

property of a datatype which is determined by the existence and specification of an order relationship on its value space

3.40

outward mapping

conceptual association between the internal datatypes of a language and the general-purpose datatypes that identifies each internal datatype with a single semantically equivalent general-purpose datatype

3.41

parametric datatype

datatype on which a datatype generator operates to produce a generated datatype

3.42

parametric value (1)

value which distinguishes one member of a datatype family from another

3.43

parametric value (2)

value which is a parameter of a datatype or datatype generator defined by a type-declaration

NOTE See 9.1.

3.44

primitive datatype

identifiable datatype that cannot be decomposed into other identifiable datatypes without loss of all semantics associated with the datatype

3.45

primitive internal datatype

datatype in a particular programming language whose values, conceptually, are not constructed in any way from values of other datatypes in the language

3.46

provision

expression of normative wording that takes the form of a statement, an instruction, a recommendation or a requirement

NOTE 1 Adapted from ISO/IEC Guide 2.

NOTE 2 These types of provision are distinguished by the form of wording they employ; e.g. instructions are expressed in the imperative mood, recommendations by the use of the auxiliary "should" and requirements by the use of the auxiliary "shall".

3.47

recommendation

provision that conveys advice or guidance

[ISO/IEC Guide 2]

3.48

regular value

element of a value space that is consistent with a datatype's properties and characterizing operations

3.49

representation

⟨general-purpose datatype⟩ mapping from the value space of the general-purpose datatype to the value space of some internal datatype of a computer system, file system or communications environment

3.50**representation**

⟨value⟩ sign(s) of that value in the representation of the datatype

NOTE In this context, the term “sign” is used in its terminological sense (i.e. a symbol) and not in its mathematical sense (i.e. positive or negative).

3.51**requirement**

provision that conveys criteria to be fulfilled

[ISO/IEC Guide 2]

3.52**sentence**

⟨EBNF⟩ sequence of symbols that represents the start symbol

[ISO/IEC 14977]

NOTE See note in 5.1 concerning the context of the specialized usage of this term.

3.53**sentinel value**

element of a value space that is not completely consistent with a datatype's properties and characterizing operations

NOTE A numeric datatype, which includes characterizing operations such as **Equal** and **InOrder**, may include sentinel values such as **not-a-number**, **indeterminate**, **not-applicable**, **infinity**, **-infinity** and so on. These characterizing operations are not defined for sentinel values.

3.54**sequence**

⟨EBNF⟩ ordered list of zero or more items

[ISO/IEC 11404:2007](https://standards.iteh.ai/catalog/standards/sist/0bfl626f-9d7d-4b8a-a863-2d68fd7df31/iso-iec-11404-2007)

<https://standards.iteh.ai/catalog/standards/sist/0bfl626f-9d7d-4b8a-a863-2d68fd7df31/iso-iec-11404-2007>

[ISO/IEC 14977]

NOTE See note in 5.1 concerning the context of the specialized usage of this term.

3.55**start symbol**

⟨EBNF⟩ non-terminal symbol that is defined by one or more syntax rules but does not occur in any other syntax rule

[ISO/IEC 14977]

NOTE See note in 5.1 concerning the context of the specialized usage of this term.

3.56**statement**

provision that conveys information

[ISO/IEC Guide 2]

3.57**subsequence**

⟨EBNF⟩ sequence within a sequence

[ISO/IEC 14977]

NOTE See note in 5.1 concerning the context of the specialized usage of this term.