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Date and time — Vocabulary

Date et l'heure — Vocabulaire

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Foreword

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Introduction

ISO documents relating to date and time concepts have been available since 1971.

This document presents terms and definitions for selected concepts relevant to date and time concepts and of their representation.

Specifically, the terminology presented in this document:

— serves as a sound basis in the understanding of date and time;

— guides new developments in the field by underpinning mutual understanding;

— serves as a quick and handy reference for those newly inaugurated to this field.

In this document, the decimal sign is a comma on the line, and each group of three digits are separated by a small space from the preceding digits, counting from the decimal sign, in accordance with the ISO/IEC Directives, Part 2.

However, Resolution 10 of the 22nd General Conference on Weights and Measures (Conférence Générale des Poids et Mesures, CGPM) in 2003 stated that:

“The decimal marker shall be either a point on the line or a comma on the line.”

And reaffirmed the following resolution from Resolution 7 of the 9th CGPM, 1948:

“Numbers may be divided in groups of three in order to facilitate reading.”

In practice, the choice between these alternatives depends on customary use in the language concerned. In the technical areas of date and time, it is customary for the decimal point always to be used, and that numbers are not grouped, for all languages.

Date and time — Vocabulary

1 Scope

This document defines terms related to date and time, from fundamental concepts to those of their usage and representation.

2 Normative references

There are no normative references in this document.

3 Terms related to general concepts

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
date
time (3.2) on the *calendar system* (6.1) *time scale* (3.5)

Note 1 to entry: Common forms of date include *calendar date* (7.8), *ordinal date* (7.9) and *week date* (7.10).

3.2
time
mark attributed to an *instant* (3.4) or a *time interval* (3.6) on a specified *time scale* (3.5)

Note 1 to entry: The term "time" is often used in common language. However, it should only be used if the meaning is clearly visible from the context.

Note 2 to entry: On a time scale consisting of successive time intervals, such as a *clock system* (5.1) or *calendar system* (6.1), distinct instants may be expressed by the same time.

Note 3 to entry: This definition corresponds with the definition of the term "date" in IEC 60050-113:2011, 113-01-12.

3.2.1
proper time
time (3.2) on a *proper time scale* (4.1)

Note 1 to entry: See ITU-R TF.2018-0 and the BIPM SI Brochure[9] for additional information.

3.2.2
coordinate time
time on a *coordinate time scale* (4.2)

Note 1 to entry: Coordinate time is a mathematical coordinate in the four-dimensional space-time of the coordinate system. For a given event, the coordinate time has the same value everywhere.

Note 2 to entry: Coordinate times are not measured; rather, they are computed from the *proper times* (3.2.1) of clocks.

Note 3 to entry: The relation between coordinate time and proper time depends on the clock's position and state of motion in its gravitational environment and is derived by integration of the space-time interval.

Note 4 to entry: See ITU-R TF.2018-0 and BIPM SI Brochure[9] for additional information.

3.3
time axis
mathematical representation of the succession in time according to the space-time reference of instantaneous events along a unique axis

Note 1 to entry: According to the theory of special relativity, the time axis depends on the choice of a spatial reference frame.

Note 2 to entry: In IEC 60050-113:2011, 113-01-03, time according to the space-time reference is defined to be the one-dimensional subspace of space-time, locally orthogonal to space.

[SOURCE: IEC 60050-113:2011, 113-01-07, modified — In the definition, “time” is clarified as “time according to the space-time reference”; in note 1 to entry, the phrase “special theory of relativity” has been changed to “theory of special relativity” for clarity; note 2 to entry has been added.]

3.4
instant
point on the *time axis* (3.3)

Note 1 to entry: An instantaneous event occurs at a specific instant.

[SOURCE: IEC 60050-113:2011, 113-01-08]

3.5
time scale
timescale
system of ordered marks which can be attributed to *instants* (3.4) on the *time axis* (3.3), one instant being chosen as the origin

EXAMPLE 1 *TAI* (4.9) is a continuous time scale.

EXAMPLE 2 *UTC* (4.7) is a time scale that is continuous but contains discontinuities. Discontinuities in UTC arise from the mechanism of inserting *leap seconds* (4.8).

EXAMPLE 3 *Local time* (4.6) with periodic changing of offsets from UTC during the year, such as seasonal time changes like summer time and winter time, results in a time scale that is continuous with discontinuities.

EXAMPLE 4 A *calendar system* (6.1) is a time scale composed of successive steps, with the time axis split up into a succession of consecutive *time intervals* (3.6), where the same mark is attributed to all instants of each time interval. For instance, all instants within a *calendar day* (7.13) are referred to by a reference to that calendar day only.

EXAMPLE 5 In signal processing, the process of sampling results in a discrete time scale.

Note 1 to entry: The system of ordered marks may be of the following nature: continuous, continuous with discontinuities, in successive steps, or discrete.

Note 2 to entry: The definition, notes to entry and EXAMPLEs are derived from IEC 60050-113:2011, 113-01-11, “timescale”.

3.6
time interval
part of the *time axis* (3.3) limited by two *instants* (3.4)

Note 1 to entry: Unless otherwise stated, a time interval is by default a *closed time interval* (3.6.1), which includes the limiting instants themselves.

[SOURCE: IEC 60050-113:2011, 113-01-10, modified – The original NOTEs have been deleted; note 1 to entry has been added.]

3.6.1
closed time interval
[*a*,*b*]
time interval (3.6) that includes both the beginning *instant* (3.4) and the final instant

3.6.2
open time interval
(*a*,*b*)
time interval (3.6) that does not include either the beginning *instant* (3.4) or the final instant

3.6.3
right half-open time interval
contiguous time interval
[*a*,*b*)
time interval (3.6) that includes the beginning *instant* (3.4) but not the final instant

3.6.4
left half-open time interval
(*a*,*b*]
time interval (3.6) that includes the final *instant* (3.4) but not the beginning instant

3.6.5
recurring time interval
series of consecutive *time intervals* (3.6) of identical *duration* (3.7)

Note 1 to entry: If the duration of the time intervals is measured in *calendar system* (6.1) entities, the duration of each time interval depends on the *calendar dates* (7.8) of its start and its end.

Note 2 to entry: If the starting *instants* (3.4) of time intervals are repeated according to a set of rules, the "repeat rules for recurring time intervals" in ISO 8601-2:2019, Clause 5 apply.

3.7
duration
non-negative quantity attributed to a *time interval* (3.6), the value of which is equal to the difference between the quantitative times of the final *instant* (3.4) and the initial instant of the time interval

Note 1 to entry: Duration is one of the base quantities in the International System of Quantities (ISQ) on which SI is based. The term "time" instead of "duration" is often used in this context and also for an infinitesimal duration.

Note 2 to entry: For the term "duration", expressions such as "time" or "time interval" are often used, but the term "time" is not recommended in this sense and the term "time interval" is deprecated in this sense to avoid confusion with the concept of "time interval".

Note 3 to entry: The exact duration of a *time scale unit* (7.1) depends on the *time scale* (3.5) used. For example, the durations of a year, month, week, day, hour, or minute, may depend on when they occur (e.g. in a Gregorian calendar, a *calendar month* (7.21) can have a duration of 28, 29, 30, or 31 days; in a *24-hour clock system* (5.2), a *clock minute* (7.5) can have a duration of 59, 60, or 61 seconds). Therefore, the exact duration of a time scale unit can only be evaluated if the exact duration of each composing element is known.

Note 4 to entry: The SI unit of duration is *second* (7.2). Time scale units derived from the *SI second* (7.2) are acceptable for use with the SI, namely, *minute* (7.4) (1 min = 60 s), *hour* (7.6) (1 h = 60 min = 3 600 s) and *day* (7.11) (1 d = 24 h = 86 400 s). These time invariant units are used for the scales of a stopwatch with an additional scale for the number of days, if applicable.

Note 5 to entry: Realizations of the SI-second-derived units on time intervals and the differences between SI-derived units and the calendar or clock units are used to handle duration changes such as those due to *leap seconds* (4.8) and discontinuities such as those caused by the periodic changing of offsets from *UTC* (4.7) during the year. By equating *clock day* (7.12) to *calendar day* (7.13), this sequence can be continued by calendar day to *calendar year* (7.23), hence allowing UTC and its *time shifts* (3.9) to be used in a continuous manner within calendar time scales.

Note 6 to entry: This definition is closely related to NOTE 1 of "duration" in IEC 60050-113:2011, 113-01-13.

3.7.1
negative duration
duration (3.7) in the reverse direction to the proceeding *time scale* (3.5)

3.8
time of day
time (3.2) occurring within a *calendar day* (7.13)

Note 1 to entry: Generally, time of day relates to the *duration* (3.7) elapsed after the beginning of the day. However, this correlation breaks when changes occur in the *time scale* (3.5) that applies to the time of day, such as *time shifts* (3.9) and *leap seconds* (4.8).

Note 2 to entry: This definition corresponds closely with the definition of "clock time" given in IEC 60050-113:2011, 113-01-18, except that the concepts of duration and time scale are not used in this definition.

3.8.1
basis time of day
time of day (3.8) in a *basis time scale* (4.3)

3.8.2
UTC of day
time of day (3.8) in *UTC* (4.7)

3.8.3
local time of day
time of day (3.8) in a *local time* (4.6)

3.9
time shift
difference between the marks attributed to the same *instant* (3.4) between *times* (3.2) of two *time scales* (3.5)

3.10
equation of time
difference between mean solar time and apparent solar time, which varies with time within a *calendar year* (7.23)

Note 1 to entry: A wall clock, for instance, is a type of device that indicates mean solar time, while a sundial is a type of device that indicates apparent solar time.

4 Terms related to time scales

4.1
proper time scale
time scale (3.5) produced by a continuously running primary frequency standard not compensated for gravitational frequency shift

Note 1 to entry: An ideal clock, which exactly realizes the *SI second* (7.2), is a *clock system* (5.1) that is a proper time scale.

Note 2 to entry: This definition is derived from ITU-R TF.2018-0.

4.2
coordinate time scale
time scale (3.5) independent of the equations of motion of material bodies and in the equations of propagation of electromagnetic waves

EXAMPLE *TCG* (4.13), *TT* (4.12), *UTC* (4.7) and *TAI* (4.9).

Note 1 to entry: This definition is derived from ITU-R TF.2018-0.

4.3
basis time scale
time scale (3.5) established to serve as reference time by a competent authority

EXAMPLE GPS system time, Galileo system time, GLONASS system time and BeiDou system time, are examples of basis time scales established by operators of global navigation satellite systems for internal use. They differ from *UTC* (4.7) by integer hours (GLONASS), integer seconds (all other, except GLONASS) and small fractions of microseconds (all).

Note 1 to entry: UTC is the recommended basis time scale for all civil and scientific applications.

Note 2 to entry: The *local time* (4.6) in a location is often defined as UTC plus a certain *time shift* (3.9), but not necessarily in all.

4.4
standard time
time scale (3.5) derived from a *basis time scale* (4.3) with a *time shift* (3.9) established by a competent authority

EXAMPLE 1 Some standard times vary within a year, such as US Eastern Time (ET) and Australian Central Standard Time (ACST).

EXAMPLE 2 Some standard times do not vary within a year, such as US Eastern Standard Time (EST), US Eastern Daylight Time (EDT), Central European Time (CET), Central European Summer Time (CEST), Australia Western Standard Time (AWST), Korea Standard Time (KST), China Standard Time (CST), Hong Kong Standard Time (HKT) and Japanese Standard Time (JST).

Note 1 to entry: The time shift of a standard time may vary in the course of a year, as decided by the competent authority, e.g. for introducing daylight saving time.

Note 2 to entry: The *local time* (4.6) may switch between different standard times for administrative reasons, for instance, a regulatory decision to adopt a different standard time.

Note 3 to entry: Many standard times use *UTC* (4.7) as their basis and are often associated with a geographical location.

Note 4 to entry: This definition corresponds closely to, but is more general than, the definition of the term “standard time” in IEC 60050-113:2011, 113-01-17.

4.5
adjusted time
time scale (3.5) derived from a *basis time scale* (4.3) with a *time shift* (3.9), established by a competent authority that also defines a *standard time* (4.4)

EXAMPLE 1 Central European Summer Time (CEST) is an adjusted time in comparison with Central European Time (CET), a standard time.

EXAMPLE 2 US Eastern Daylight Time (EDT) is an adjusted time in comparison with US Eastern Standard Time (EST), a standard time.

4.6
local time
local time scale
time scale (3.5) applied locally of either a *standard time* (4.4) or *adjusted time* (4.5), as decided by a competent authority

EXAMPLE Local time in some locations is subject to seasonal adjustments between standard times and adjusted times. For instance, between Western European Time (WET) and Western European Daylight Time (WEDT) and between US Pacific Standard Time (PST) and US Pacific Daylight Time (PDT).