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Internet Engineering Task Force (IETF)
Request for Comments: 8943
Category: Standards Track
ISSN: 2070-1721

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November 2020

Concise Binary Object Representation (CBOR) Tags for Date

Abstract

The Concise Binary Object Representation (CBOR), as specified in RFC 7049, is a data format whose design goals include the possibility of extremely small code size, fairly small message size, and extensibility without the need for version negotiation.

In CBOR, one point of extensibility is the definition of CBOR tags. RFC 7049 defines two tags for time: CBOR tag 0 (date/time string as per RFC 3339) and tag 1 (POSIX "seconds since the epoch"). Since then, additional requirements have become known. This specification defines a CBOR tag for a date text string (as per RFC 3339) for applications needing a textual date representation within the Gregorian calendar without a time. It also defines a CBOR tag for days since the date 1970-01-01 in the Gregorian calendar for applications needing a numeric date representation without a time. This specification is the reference document for IANA registration of the CBOR tags defined.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 7841.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at https://www.rfc-editor.org/info/rfc8943.

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1. Introduction

The Concise Binary Object Representation (CBOR) [RFC7049] provides for the interchange of structured data without a requirement for a pre-agreed schema. RFC 7049 defines a basic set of data types, as well as a tagging mechanism that enables extending the set of data types supported via an IANA registry.

This specification defines a CBOR tag for a text string representing a date without a time. The tagged text string is represented as specified by the RFC 3339 [RFC3339] "full-date" production. Per RFC 3339, this represents a date within the Gregorian calendar.

This specification also defines a CBOR tag for an integer representing a date without a time. The tagged integer is an unsigned or negative value indicating the number of days since the Gregorian calendar date 1970-01-01. As an implementation note, this value has a constant offset from the Modified Julian Date value (which is defined by the Smithsonian Astrophysical Observatory as the number of days since November 17, 1858); this value is the Modified Julian Date minus 40587.

Note that since both tags are for dates without times, times of day, time zones, and leap seconds are not applicable to these values. These tags are both for representations of Gregorian calendar dates.

1.1. Calendar Dates

Calendar dates are used for numerous human use cases, such as marking the dates of significant events. For instance, John Lennon was born on October 9, 1940 and died on December 8, 1980. One such use case is driver's licenses, which typically include a date of birth. The dates used in this specification use the Gregorian calendar, as do those in RFC 3339 [RFC3339]. The time zones and actual times of these events are intentionally not represented in the calendar date.

The epoch chosen for the second tag, which represents days since the Gregorian calendar date 1970-01-01, is related to the IEEE Std 1003.1, 2013 Edition [POSIX.1] time epoch 1970-01-01T00:00:00Z UTC only insofar as both contain the date 1970-01-01. This should not be construed as indicating that dates using this tag represent either a specific time of day and/or time zone.

The day of the week (Sunday, Monday, Tuesday, etc.) is not explicitly represented in either of these date formats. However, deterministic algorithms that are beyond the scope of this specification can be used to derive the day of the week in the Gregorian calendar from dates represented in both of these formats.

1.1.1. Example Date Representations

This table contains example representations for dates using both tags.

Date	Tag 1004	Tag 100
October 9, 1940	"1940-10-09"	-10676
December 8, 1980	"1980-12-08"	3994

Table 1

1.2. Comparing Dates

Comparison of dates in "full-date" format can be accomplished by normal string comparison, since, by design, the digits representing the date are in fixed format and ordered from most significant to least significant. Comparison of numeric dates representing days since 1970-01-01 can be performed by normal integer comparison. Comparison of dates in other formats or using other calendars require conversions that are beyond the scope of this specification.

Note that different dates may correspond to the same moment in time, depending upon the time zone in which the date was determined. For instance, at many times of the day, a conference call occurring on a particular date in Japan will simultaneously occur on the previous date in Hawaii; at many times of the day, Japan's Friday corresponds with Hawaii's Thursday.

1.3. Comparing Dates and Date/Time Values

Comparing dates with date/time values, which represent a particular moment in time, is beyond the scope of this specification. That said, if a date is augmented with a time zone and time of day, a specific date/time value can be determined, and comparing that date/time value to others becomes possible. For instance, if one were to augment John Lennon's birth date of October 9, 1940 with the time of day and time zone of his birth, then it would be possible to derive a date/time at which he was born that could be compared with other date/time values.

2. IANA Considerations

2.1. Concise Binary Object Representation (CBOR) Tags Registrations

This section registers the following values in the IANA "Concise Binary Object Representation (CBOR) Tags" registry [IANA.cbor-tags].

Tag: 1004
Data Item: UTF-8 text string
Semantics: [RFC3339] full-date string
Reference: RFC 8943

Tag: 100 (ASCII 'd')
Data Item: Unsigned or negative integer
Semantics: Number of days since the epoch date 1970-01-01
Reference: RFC 8943

3. Security Considerations

The security considerations of RFC 7049 apply; the tags introduced here are not expected to raise security considerations beyond those.

A date, of course, has significant security considerations. These include the exploitation of ambiguities where the date is security relevant or where the date is used in access control decisions.

When using a calendar date for decision making (for example, access control), it needs to be noted that since calendar dates do not represent a specific point in time, the results of the evaluation can differ depending upon where the decision is made. For instance, a person may have reached their 21st birthday in Japan while simultaneously being a day short of their 21st birthday in Hawaii. Similarly, it would be inappropriate to use only a date to trigger certificate expiration, since a date corresponds to a range of times worldwide rather than a specific point in time that is independent of geographic location.

4. References

4.1. Normative References

[RFC3339] Klyne, G. and C. Newman, "Date and Time on the Internet: Timestamps", RFC 3339, DOI 10.17487/RFC3339, July 2002, <https://www.rfc-editor.org/info/rfc3339>.

[RFC7049] Bormann, C. and P. Hoffman, "Concise Binary Object Representation (CBOR)", RFC 7049, DOI 10.17487/RFC7049, October 2013, <https://www.rfc-editor.org/info/rfc7049>.

4.2. Informative References

[IANA.cbor-tags] IANA, "Concise Binary Object Representation (CBOR) Tags", <https://www.iana.org/assignments/cbor-tags>.

[POSIX.1] IEEE, "The Open Group Base Specifications Issue 7", 2013 Edition, IEEE Std 1003.1, 2013, <https://pubs.opengroup.org/onlinepubs/9699919799.2013edition>.

[TIME-TAGS] Bormann, C., Gamari, B., and H. Birkholz, "Concise Binary Object Representation (CBOR) Tags for Time, Duration, and Period", Work in Progress, Internet-Draft, draft-bormann-cbor-time-tag-03, 9 March 2020, <https://tools.ietf.org/html/draft-bormann-cbor-time-tag-03>.

Acknowledgements

Thanks to Carsten Bormann for supporting creation of this specification. Parts of the explanatory text in this specification come from [TIME-TAGS].

Thanks to these people for reviews of the specification: Henk Birkholz, Carsten Bormann, Samita Chakrabarti, Roman Danyliw, Linda Dunbar, Benjamin Kaduk, Erik Kline, Warren Kumari, Barry Leiba, Thiago Macieira, Francesca Palombini, Michael Richardson, Kyle Rose, Jim Schaad, Juergen Schoenwaelder, Ã\211ric Vyncke, Robert Wilton, and Dale Worley.

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