A Universally Unique IDentifier (UUID) URN Namespace

Abstract

This specification defines a Uniform Resource Name namespace for UUIDs (Universally Unique IDentifier), also known as GUIDs (Globally Unique IDentifier). A UUID is 128 bits long, and can guarantee uniqueness across space and time. UUIDs were originally used in the Apollo Network Computing System and later in the Open Software Foundation's (OSF) Distributed Computing Environment (DCE), and then in Microsoft Windows platforms.

This specification is derived from the DCE specification with the kind permission of the OSF (now known as The Open Group). Information from earlier versions of the DCE specification have been incorporated into this document.

https://datatracker.ietf.org/doc/html/rfc4122

> One of the main reasons for using UUIDs is that no centralized authority is required to administer them (although one format uses IEEE 802 node identifiers, others do not). As a result, generation on demand can be completely automated, and used for a variety of purposes. The UUID generation algorithm described here supports very high allocation rates of up to 10 million per second per machine if necessary, so that they could even be used as transaction IDs.

> UUIDs are of a fixed size (128 bits) which is reasonably small compared to other alternatives. This lends itself well to sorting, ordering, and hashing of all sorts, storing in databases, simple allocation, and ease of programming in general.

Since UUIDs are unique and persistent, they make excellent **Uniform Resource Names**. The unique ability to generate a new UUID without a registration process allows for UUIDs to be one of the URNs with the lowest minting cost.

Format

```
time_low               unsigned 32   0-3    The low field of the
                          bit integer          timestamp

   time_mid               unsigned 16   4-5    The middle field of the
                          bit integer          timestamp

   time_hi_and_version    unsigned 16   6-7    The high field of the
                          bit integer          timestamp multiplexed
                                               with the version number

   clock_seq_hi_and_rese  unsigned 8    8      The high field of the
   rved                   bit integer          clock sequence
                                               multiplexed with the
                                               variant

   clock_seq_low          unsigned 8    9      The low field of the
                          bit integer          clock sequence

   node                   unsigned 48   10-15  The spatially unique
                          bit integer          node identifier

   In the absence of explicit application or presentation protocol
   specification to the contrary, a UUID is encoded as a 128-bit object,
   as follows:

   The fields are encoded as 16 octets, with the sizes and order of the
   fields defined above, and with each field encoded with the Most
   Significant Byte first (known as network byte order).  Note that the
   field names, particularly for multiplexed fields, follow historical
   practice.

   0                   1                   2                   3
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                          time_low                             |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |       time_mid                |         time_hi_and_version   |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
|clk_seq_hi_res |  clk_seq_low  |         node (0-1)            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         node (2-5)                            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

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