About Leap Seconds

A leap second is a second, as measured by an atomic clock, added to or subtracted from Coordinated Universal Time (UTC) to make it agree with astronomical time to within 0.9 second. It compensates for slowing in the Earth’s rotation and is added during the end of June or December. It is important to look at how seconds are used in relation to modern time keeping to gain an understanding of the concept of the leap second and why it is used.

No positive leap second will be introduced at the end of June 2010.

How Leap Seconds Declared?

The International Earth Rotation and Reference System Service (IERS) observes the Earth’s rotation and nearly six months in advance (January and July) a “Bulletin C” message is sent out, which reports whether or not to add a leap second in the end of June and December.

IERS schedules a leap second as needed to keep the time difference between atomic clocks and Earth’s rotation to below 0.9 seconds.

How are Leap Seconds Inserted?

Leap seconds are inserted at the end of June or December as an additional second after 23:59:59 UTC (Universal Time Coordinated). The additional second is the 61st second of the last minute of the month, and it is written as 23:59:60 (or 11:59:60 PM in 12-hour format).

The second is inserted at the same time all over the world - the actual local time will therefore depend on the time zone. Only regions in the UTC time zone will add the second just before midnight, for time zones east of UTC, the second will be added the next day (first day in January or July), for time zones west of UTC, the second will be added earlier on the same day as for UTC.

Last leap second on 2008-12-31 23:59:60 UTC

The last leap second was inserted like this, in the UTC time scale, and corresponding times elsewhere in the world. (2008-12-31 means December 31, 2008, and 2009-01-01 means January 1, 2009).

<table>
<thead>
<tr>
<th>UTC Date</th>
<th>UTC Time</th>
<th>Local time world-wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-12-31</td>
<td>23:59:57</td>
<td>Corresponding times</td>
</tr>
<tr>
<td>2008-12-31</td>
<td>23:59:58</td>
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<td>23:59:59</td>
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<td>2008-12-31</td>
<td>23:59:60</td>
<td>Leap second added</td>
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<td>2009-01-01</td>
<td>00:00:00</td>
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</tbody>
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IERS Announcement of January 2010
A leap second bulletin sent by IERS on January 14, 2010 is displayed here:

INTERNATIONAL EARTH ROTATION AND REFERENCE SYSTEMS SERVICE (IERS)

SERVICE INTERNATIONAL DE LA ROTATION TERRESTRE ET DES SYSTEMES DE REFERENCE

SERVICE DE LA ROTATION TERRESTRE

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Paris, 14 January 2010

Bulletin C 39

To authorities responsible for the measurement and distribution of time

INFORMATION ON UTC - TAI

NO positive leap second will be introduced at the end of June 2010.
The difference between Coordinated Universal Time UTC and the International Atomic Time TAI is :

from 2009 January 1, 0h UTC, until further notice : UTC-TAI = -34 s

Leap seconds can be introduced in UTC at the end of the months of December or June, depending on the evolution of UT1-TAI. Bulletin C is mailed every six months, either to announce a time step in UTC, or to confirm that there will be no time step at the next possible date.

Daniel GAMBIS
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Observatoire de Paris, France