

Debian, leap seconds, timezones, and zdump

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The first leap second since 1998 comes today at 23:59:60 UTC (19:59:60 Eastern Standard Time). See <http://www.leapsecond.com/notes/leap-watch.htm> for some background and fun things to do then. See also NIST's leap-second-enabled java applet at

<http://nist.time.gov/>

The announcement was made back in July, but the Debian glibc6 package hasn't yet been updated so the arcane and deprecated little "zdump" trick in Linux that allows them to be documented doesn't know about this one. No big deal, since most people don't care about time that precisely, and don't use the "right/" timezones that allow them to be noticed, but FWIW....

Here are some notes on facilities in some Unix systems to show evidence of leap seconds.

First, this should work for everyone who cares about time and runs ntp. Make sure you're in NTP sync with a host that knows a leap second is coming. Look for "leap=01" in the output of this:

```
$ ntpq -c rv
assID=0 status=46f4 leap_add_sec, sync_ntp, 15 events, event_peer/strat_chg,
version="ntpd 4.2.0a@1:4.2.0a-11-r Mon Mar 14 12:39:28 GMT 2005 (1)"?,
processor="i686", system="Linux/2.6.10-6-386", leap=01, stratum=3,
precision=-19, rootdelay=158.366, rootdispersion=77.103, peer=17708,
refid=82.211.81.145,
reftime=c76127cd.19f9acff Sat, Dec 31 2005 8:52:45.101, poll=7,
clock=0xc7612b1b.74322291, state=4, offset=-0.430, frequency=37.132,
error=0.572, jitter=1.795, stability=64.092
```

For enduring knowledge of leap seconds, and accurate calculations of the difference between two Unix timestamps, one on either side of a leap second, you need more than ntp. I'm no expert (help!) but it appears that on many Unix systems, the "Olson" notion of "right/" timezones allows the system to understand leap seconds. Note though that it is deprecated since it breaks many other things. But today is

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leap-second-day, so lets see what could help accomodate that.

E.g. note the back-to-back output of two date commands, with and without the "right/" timezone prefix:

```
$ date; TZ=right/US/Mountain date;  
Sat Dec 31 09:56:22 MST 2005  
Sat Dec 31 09:56:00 MST 2005
```

That prefix tells the date command that the system clock includes all seconds (including leap seconds) since the unix epoch in 1970. Since that is not true on my machine, it is off by the 22 leap seconds since then.

But tomorrow will it know about the 23rd one? That depends on up-to-date timezone files.

The zdump command shows time discontinuities (daylight savings, leap seconds, and legal changes) for the files installed somewhere like /usr/share/zoneinfo. E.g. here is an excerpt of its output on my Ubuntu 5.10 (Breezy) system:

```
$ zdump -v right/UTC  
...  
right/UTC Thu Dec 31 23:59:60 1998 UTC = Thu Dec 31 23:59:60 1998 UTC isdst=0 gmtoff=0  
right/UTC Fri Jan 1 00:00:00 1999 UTC = Fri Jan 1 00:00:00 1999 UTC isdst=0 gmtoff=0
```

Note the famous 23:59:60 entry for the last leap second. But note that it dosen't now about the 2005 leap second, despite the fact that my release of Ubuntu came out in October of 2005. The Debian releases, including unstable, don't seem to be updated either. But Redhat's Fedora core 4 is up-to-date, as are RHEL and centos.

zdump works for other time zones also, including daylight savings times changes:

```
$ zdump -v right/US/Mountain | grep 1998  
right/US/Mountain Sun Apr 5 08:59:59 1998 UTC = Sun Apr 5 01:59:59 1998 MST isdst=0 gmtoff=-25200  
right/US/Mountain Sun Apr 5 09:00:00 1998 UTC = Sun Apr 5 03:00:00 1998 MDT isdst=1 gmtoff=-21600  
right/US/Mountain Sun Oct 25 07:59:59 1998 UTC = Sun Oct 25 01:59:59 1998 MDT isdst=1  
gmtoff=-21600  
right/US/Mountain Sun Oct 25 08:00:00 1998 UTC = Sun Oct 25 01:00:00 1998 MST isdst=0  
gmtoff=-25200  
right/US/Mountain Thu Dec 31 23:59:60 1998 UTC = Thu Dec 31 16:59:60 1998 MST isdst=0  
gmtoff=-25200  
right/US/Mountain Fri Jan 1 00:00:00 1999 UTC = Thu Dec 31 17:00:00 1998 MST isdst=0 gmtoff=-25200
```

```
$ zdump -v right/US/Mountain | grep 2005
```

```
right/US/Mountain Sun Oct 30 07:59:59 2005 UTC = Sun Oct 30 01:59:59 2005 MDT isdst=1  
gmtoff=-21600
```

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right/US/Mountain Sun Oct 30 08:00:00 2005 UTC = Sun Oct 30 01:00:00 2005 MST isdst=0
gmtoff=-25200

You can get updated time zone tables as indicated at
<http://www.twinsun.com/tz/tz-link.htm>

It also includes changes for US daylight savings in 2007.
The package that needs updating for Debian and Ubuntu is "libc6"

See <http://www.ucolick.org/~sla/leapsecs/> for tons
more info.

Neal McBurnett <http://bcn.boulder.co.us/~neal/>
Signed and/or sealed mail encouraged. GPG/PGP Keyid: 2C9EBA60

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