Funtimes (and fundates) with `lubridate`

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Dates and times are complicated

Dates and times in R are worse

Familiar?

```
this_date <- "2014-03-31"
day <- sub("\\d{4}-\\d{2}-(\\d{2})","\\1",this_date)
sub("\\d{2}$",as.numeric(day)+1,this_date)
```

```
## [1] "2014-03-32"
```

What about...

```
this_date <- as.numeric(strsplit("2014-02-28","-")[[1]])
that_date <- as.numeric(strsplit("2014-03-01","-")[[1]])

secs <-
  sum(that_date * c(365*24*60*60,30*24*60*60,24*60*60)) -
  sum(this_date * c(365*24*60*60,30*24*60*60,24*60*60))
secs
```

```
## [1] 259200
```

```
secs/(60*60*24)
```

```
## [1] 3
```

Journal of Statistical Software

April 2011, Volume 40, Issue 3. http://www.jstatsoft.org/

Dates and Times Made Easy with lubridate

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An important lie

Human-readable dates can be specified in universally understood formats like 05/07/11

parsing dates

if you know the format:

```
library(lubridate)
ymd("2004-12-03")
```

```
## [1] "2004-12-03 UTC"
```

```
# as American-style date
mdy("03/04/11")
```

```
## [1] "2011-03-04 UTC"
```

```
# as Euro-style date
dmy("03/04/11")
```

```
## [1] "2011-04-03 UTC"
```

extracting parts of dates

```
today <- now()
today
```

```
## [1] "2014-07-17 10:03:03 BST"
```

```
month(today)
```

```
## [1] 7
```

```
month(today, label = TRUE, abbr = FALSE)
```

```
## [1] July
## 12 Levels: January < February < March < April < May < Ju
```

arithmetic

```
tomorrow <- today + days(1)
tomorrow
```

```
## [1] "2014-07-18 10:03:03 BST"
```

```
month_from_today <- today + months(1)
month_from_today
```

```
## [1] "2014-08-17 10:03:03 BST"
```

rounding

```
this.date <- ymd_hms("2004-04-08 12:54:15")
round_date(this.date,"hour")
```

```
## [1] "2004-04-08 13:00:00 UTC"
```

```
floor_date(this.date,"hour")
```

```
## [1] "2004-04-08 12:00:00 UTC"
```

sequences

```
today + (0:5) * days(1)
```

```
## [1] "2014-07-17 10:03:03 BST" "2014-07-18 10:03:03 BST"
## [3] "2014-07-19 10:03:03 BST" "2014-07-20 10:03:03 BST"
## [5] "2014-07-21 10:03:03 BST" "2014-07-22 10:03:03 BST"
```

Some more lies

- There are always 24 hours in a day
- Months have either 30 or 31 days
- February is always 28 days long
- Years have 365 days
- There is a leap year every year divisible by 4

instants, durations and periods

- a date-time is an *instant*
- what if we want to specify a length of time
- *durations* are exact time spans recorded in seconds
- *periods* are inexact measures (seconds in a month changes)

intervals

```
dave_age <- new_interval(ymd_h("1986-01-29 03"), now())
dave_age %/% years(1)
```

```
## [1] 28
```

```
dave_age %/% weeks(2)
```

```
## [1] 742
```

```
dave_age / dweeks(1)
```

```
## [1] 1485
```

lies about timezones

- Britain uses GMT
- Time zones always differ by a whole hour
- The offsets between two time zones will remain constant

timezones

```
dave_time <- ymd_h("2014-03-09 06")
dave_time <- force_tz(dave_time,"America/New_York")
eric_time <- ymd_h("2014-03-09 11")
eric_time <- force_tz(eric_time,"Europe/London")
interval(dave_time,eric_time)/dhours(1)
```

```
## [1] 1
```

```
with_tz(eric_time,tz="America/New_York")
```

```
## [1] "2014-03-09 07:00:00 EDT"
```

things I don't like

```
# arghhh!
wday(today)
```

```
## [1] 5
```

```
# I think this should thow an error
this_day <- ymd("2014-02-28")
day(this_day) <- 34
this_day
```

```
## [1] "2014-03-06 UTC"
```

example problem (Tiago)

- seconds since the beginning of year when click had been detected
- convert to click counts per minute
- change summer -> winter time, time had gone from 00:00 to 01:00
- the minutes do not exist for R!

example problem (Tiago)

```
year_start <- ymd("2014/01/01")
click_secs <- cumsum(rpois(100,1000))+rpois(200,5)*
  rpois(200,10)
click_times <- year_start+dseconds(click_secs)
click_mins <- round_date(click_times,"minute")
hh <- hist(click_mins,
breaks=min(click_mins) +
    (0:(new_interval(min(click_mins),max(click_mins))
    /dminutes(1)))*dminutes(1),
    freq=TRUE, plot=FALSE)
```

Credit

- Noah Sussman's excellent (and unbelievable) list of untruths about time `http://infiniteundo.com/post/25326999628/falsehoods-programmers-believe-about-time`
- Noah's follow-up article `http://infiniteundo.com/post/25509354022/more-falsehoods-programmers-believe-about-time-wisdom`
- Dates and times made easy with `lubridate` by Grolemund & Wickham `http://www.jstatsoft.org/v40/i03`

Thanks!

Talk available at:

converged.yt/talks/rusers-time/talk.pdf

`.Rmd` available

converged.yt/talks/rusers-time/talk.Rmd