

Dates and times with lubridate :: CHEAT SHEET



Date-times



2017-11-28 12:00:00

A **date-time** is a point on the timeline, stored as the number of seconds since 1970-01-01 00:00:00 UTC

```
dt <- as_datetime(1511870400)
## "2017-11-28 12:00:00 UTC"
```

PARSE DATE-TIMES (Convert strings or numbers to date-times)

1. Identify the order of the year (**y**), month (**m**), day (**d**), hour (**h**), minute (**m**) and second (**s**) elements in your data.
2. Use the function below whose name replicates the order. Each accepts a **tz** argument to set the time zone, e.g. `ymd(x, tz = "UTC")`.

2017-11-28T14:02:00 `ymd_hms()`, `ymd_hm()`, `ymd_h()`
`ymd_hms("2017-11-28T14:02:00")`

2017-22-12 10:00:00 `ydm_hms()`, `ydm_hm()`, `ydm_h()`
`ydm_hms("2017-22-12 10:00:00")`

11/28/2017 1:02:03 `mdy_hms()`, `mdy_hm()`, `mdy_h()`
`mdy_hms("11/28/2017 1:02:03")`

1 Jan 2017 23:59:59 `dmy_hms()`, `dmy_hm()`, `dmy_h()`
`dmy_hms("1 Jan 2017 23:59:59")`

20170131 `ymd()`, `ydm()`, `ymd(20170131)`

July 4th, 2000 `mdy()`, `myd()`, `mdy("July 4th, 2000")`

4th of July '99 `dmy()`, `dym()`, `dmy("4th of July '99")`

2001: Q3 `yq()` Q for quarter. `yq("2001: Q3")`

07-2020 `my()`, `ym()`, `my("07-2020")`

2:01 `hms::hms()` Also `lubridate::hms()`, `hm()` and `ms()`, which return periods.* `hms::hms(sec = 0, min = 1, hours = 2, roll = FALSE)`

2017.5 `date_decimal(decimal, tz = "UTC")`
`date_decimal(2017.5)`

`now(tzone = "")` Current time in **tz** (defaults to system **tz**). `now()`

`today(tzone = "")` Current date in a **tz** (defaults to system **tz**). `today()`

`fast_strptime()` Faster `strptime`.
`fast_strptime("9/1/01", "%y/%m/%d")`

`parse_date_time()` Easier `strptime`.
`parse_date_time("9/1/01", "ymd")`

2017-11-28

A **date** is a day stored as the number of days since 1970-01-01

```
d <- as_date(17498)
## "2017-11-28"
```

GET AND SET COMPONENTS

Use an accessor function to get a component.

Assign into an accessor function to change a component in place.

12:00:00

An **hms** is a **time** stored as the number of seconds since 00:00:00

```
t <- hms::as.hms(85)
## 00:01:25
```

```
d ## "2017-11-28"
day(d) ## 28
day(d) <- 1
d ## "2017-11-01"
```

2018-01-31 11:59:59

`date(x)` Date component. `date(dt)`

2018-01-31 11:59:59

`year(x)` Year. `year(dt)`

`isoyear(x)` The ISO 8601 year.

`epiyear(x)` Epidemiological year.

2018-01-31 11:59:59

`month(x, label, abbr)` Month.
`month(dt)`

2018-01-31 11:59:59

`day(x)` Day of month. `day(dt)`

`wday(x, label, abbr)` Day of week.

`qday(x)` Day of quarter.

2018-01-31 11:59:59

`hour(x)` Hour. `hour(dt)`

2018-01-31 11:59:59

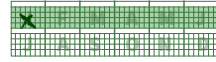
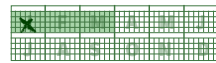
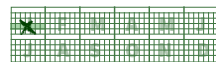
`minute(x)` Minutes. `minute(dt)`

2018-01-31 11:59:59

`second(x)` Seconds. `second(dt)`

2018-01-31 11:59:59 UTC

`tz(x)` Time zone. `tz(dt)`



`week(x)` Week of the year. `week(dt)`

`isoweek()` ISO 8601 week.

`epiweek()` Epidemiological week.

`quarter(x)` Quarter. `quarter(dt)`

`semester(x, with_year = FALSE)`
Semester. `semester(dt)`

`am(x)` Is it in the am? `am(dt)`

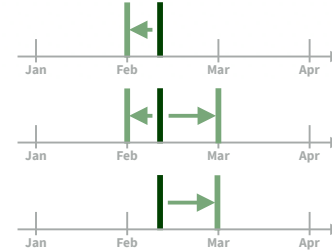
`pm(x)` Is it in the pm? `pm(dt)`

`dst(x)` Is it daylight savings? `dst(d)`

`leap_year(x)` Is it a leap year?
`leap_year(d)`

`update(object, ..., simple = FALSE)`
`update(dt, mday = 2, hour = 1)`

Round Date-times



`floor_date(x, unit = "second")`
Round down to nearest unit.
`floor_date(dt, unit = "month")`

`round_date(x, unit = "second")`
Round to nearest unit.
`round_date(dt, unit = "month")`

`ceiling_date(x, unit = "second", change_on_boundary = NULL)`
Round up to nearest unit.
`ceiling_date(dt, unit = "month")`

Valid units are second, minute, hour, day, week, month, bimonth, quarter, season, halfyear and year.

`rollback(dates, roll_to_first = FALSE, preserve_hms = TRUE)` Roll back to last day of previous month. Also `rollforward()`. `rollback(dt)`

Stamp Date-times

`stamp()` Derive a template from an example string and return a new function that will apply the template to date-times. Also `stamp_date()` and `stamp_time()`.

1. Derive a template, create a function
`sf <- stamp("Created Sunday, Jan 17, 1999 3:34")`
2. Apply the template to dates
`sf(ymd("2010-04-05"))`
`## [1] "Created Monday, Apr 05, 2010 00:00"`

Tip: use a date with day > 12

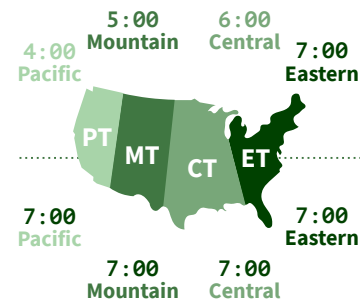
Time Zones

R recognizes ~600 time zones. Each encodes the time zone, Daylight Savings Time, and historical calendar variations for an area. R assigns one time zone per vector.

Use the **UTC** time zone to avoid Daylight Savings.

`OlsonNames()` Returns a list of valid time zone names. `OlsonNames()`

`Sys.timezone()` Gets current time zone.



`with_tz(time, tzone = "")` Get the **same date-time** in a new time zone (a new clock time). Also `local_time(dt, tz, units)`. `with_tz(dt, "US/Pacific")`

`force_tz(time, tzone = "")` Get the **same clock time** in a new time zone (a new date-time). Also `force_tzs()`. `force_tz(dt, "US/Pacific")`

Math with Date-times — Lubridate provides three classes of timespans to facilitate math with dates and date-times.



Math with date-times relies on the **timeline**, which behaves inconsistently. Consider how the timeline behaves during:

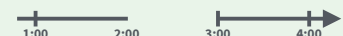
A normal day

```
nor <- ymd_hms("2018-01-01 01:30:00", tz="US/Eastern")
```



The start of daylight savings (spring forward)

```
gap <- ymd_hms("2018-03-11 01:30:00", tz="US/Eastern")
```



The end of daylight savings (fall back)

```
lap <- ymd_hms("2018-11-04 00:30:00", tz="US/Eastern")
```



Leap years and leap seconds

```
leap <- ymd("2019-03-01")
```



Periods track changes in clock times, which ignore time line irregularities.

```
nor + minutes(90)
```



```
gap + minutes(90)
```



```
lap + minutes(90)
```

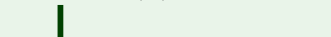


```
leap + years(1)
```

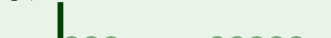


Durations track the passage of physical time, which deviates from clock time when irregularities occur.

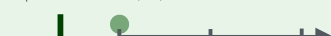
```
nor + dminutes(90)
```



```
gap + dminutes(90)
```



```
lap + dminutes(90)
```



```
leap + dyears(1)
```



Intervals represent specific intervals of the timeline, bounded by start and end date-times.

```
interval(nor, nor + minutes(90))
```



```
interval(gap, gap + minutes(90))
```



```
interval(lap, lap + minutes(90))
```



```
interval(leap, leap + years(1))
```



Not all years are 365 days due to **leap days**.

Not all minutes are 60 seconds due to **leap seconds**.

It is possible to create an imaginary date by adding **months**, e.g. February 31st

```
jan31 <- ymd(20180131)
jan31 + months(1)
## NA
```

%m+% and **%m-%** will roll imaginary dates to the last day of the previous month.

```
jan31 %m+% months(1)
## "2018-02-28"
```

add_with_rollback(e1, e2, roll_to_first = TRUE) will roll imaginary dates to the first day of the new month.

```
add_with_rollback(jan31, months(1),
  roll_to_first = TRUE)
## "2018-03-01"
```

PERIODS

Add or subtract periods to model events that happen at specific clock times, like the NYSE opening bell.

Make a period with the name of a time unit **pluralized**, e.g.

```
p <- months(3) + days(12)
```

```
p
"3m 12d 0H 0M 0S"
```

Number of months Number of days etc.

years(x = 1) x years.

months(x = 1) x months.

weeks(x = 1) x weeks.

days(x = 1) x days.

hours(x = 1) x hours.

minutes(x = 1) x minutes.

seconds(x = 1) x seconds.

milliseconds(x = 1) x milliseconds.

microseconds(x = 1) x microseconds.

nanoseconds(x = 1) x nanoseconds.

picoseconds(x = 1) x picoseconds.

period(num = NULL, units = "second", ...)
An automation friendly period constructor.
`period(5, unit = "years")`

as.period(x, unit) Coerce a timespan to a period, optionally in the specified units.
Also **is.period()**. `as.period(i)`

period_to_seconds(x) Convert a period to the "standard" number of seconds implied by the period. Also **seconds_to_period()**.
`period_to_seconds(p)`

DURATIONS

Add or subtract durations to model physical processes, like battery life. Durations are stored as seconds, the only time unit with a consistent length. **Difftimes** are a class of durations found in base R.

Make a duration with the name of a period prefixed with a **d**, e.g.

```
dd <- ddays(14)
```

```
dd
"1209600s (~2 weeks)"
```

Exact length in seconds Equivalent in common units

dyears(x = 1) 31536000x seconds.

dmonths(x = 1) 2629800x seconds.

dweeks(x = 1) 604800x seconds.

ddays(x = 1) 86400x seconds.

dhours(x = 1) 3600x seconds.

dminutes(x = 1) 60x seconds.

dseconds(x = 1) x seconds.

dmilliseconds(x = 1) $x \times 10^{-3}$ seconds.

dmicroseconds(x = 1) $x \times 10^{-6}$ seconds.

dnanoseconds(x = 1) $x \times 10^{-9}$ seconds.

dpicoseconds(x = 1) $x \times 10^{-12}$ seconds.

duration(num = NULL, units = "second", ...)
An automation friendly duration constructor. `duration(5, unit = "years")`

as.duration(x, ...) Coerce a timespan to a duration. Also **is.duration()**, **is.difftime()**.
`as.duration(i)`

make_difftime(x) Make difftime with the specified number of units.
`make_difftime(99999)`

INTERVALS

Divide an interval by a duration to determine its physical length, divide an interval by a period to determine its implied length in clock time.

Make an interval with **interval()** or **%--%**, e.g.

```
i <- interval(ymd("2017-01-01"), d)
j <- d %--% ymd("2017-12-31")
```

```
## 2017-01-01 UTC--2017-11-28 UTC
## 2017-11-28 UTC--2017-12-31 UTC
```



a %within% b Does interval or date-time *a* fall within interval *b*? `now() %within% i`



int_start(int) Access/set the start date-time of an interval. Also **int_end()**. `int_start(i) <- now()`; `int_start(i)`



int_aligns(int1, int2) Do two intervals share a boundary? Also **int_overlaps()**. `int_aligns(i, j)`



int_diff(times) Make the intervals that occur between the date-times in a vector.
`v <- c(dt, dt + 100, dt + 1000)`; `int_diff(v)`



int_flip(int) Reverse the direction of an interval. Also **int_standardize()**. `int_flip(i)`



int_length(int) Length in seconds. `int_length(i)`



int_shift(int, by) Shifts an interval up or down the timeline by a timespan. `int_shift(i, days(-1))`

as.interval(x, start, ...) Coerce a timespan to an interval with the start date-time. Also **is.interval()**. `as.interval(days(1), start = now())`