

Data Import :: CHEAT SHEET

R's **tidyverse** is built around **tidy data** stored in **tibbles**, which are enhanced data frames.



The front side of this sheet shows how to read text files into R with **readr**.



The reverse side shows how to create tibbles with **tibble** and to layout tidy data with **tidyr**.

OTHER TYPES OF DATA

Try one of the following packages to import other types of files

- **haven** - SPSS, Stata, and SAS files
- **readxl** - excel files (.xls and .xlsx)
- **DBI** - databases
- **jsonlite** - json
- **xml2** - XML
- **httr** - Web APIs
- **rvest** - HTML (Web Scraping)

Save Data

Save **x**, an R object, to **path**, a file path, as:

Comma delimited file

write_csv(x, path, na = "NA", append = FALSE, col_names = lappend)

File with arbitrary delimiter

write_delim(x, path, delim = ",", na = "NA", append = FALSE, col_names = lappend)

CSV for excel

write_excel_csv(x, path, na = "NA", append = FALSE, col_names = lappend)

String to file

write_file(x, path, append = FALSE)

String vector to file, one element per line

write_lines(x, path, na = "NA", append = FALSE)

Object to RDS file

write_rds(x, path, compress = c("none", "gz", "bz2", "xz", ...))

Tab delimited files

write_tsv(x, path, na = "NA", append = FALSE, col_names = lappend)

Read Tabular Data - These functions share the common arguments:

read_*(file, col_names = TRUE, col_types = NULL, locale = default_locale(), na = c("", "NA"), quoted_na = TRUE, comment = "#", trim_ws = TRUE, skip = 0, n_max = Inf, guess_max = min(n(1000, n_max), progress = interactive()))

Comma Delimited Files

read_csv("file.csv")

To make file.csv run:

write_file(x = "a,b,c\n1,2,3\n4,5,NA", path = "file.csv")

Semi-colon Delimited Files

read_csv2("file2.csv")

write_file(x = "a;b;c\n1;2;3\n4;5;NA", path = "file2.csv")

Files with Any Delimiter

read_delim("file.txt", delim = "|")

write_file(x = "a|b|c\n1|2|3\n4|5|NA", path = "file.txt")

Fixed Width Files

read_fwf("file.fwf", col_positions = c(1, 3, 5))

write_file(x = "a b c\n1 2 3\n4 5 NA", path = "file.fwf")

Tab Delimited Files

read_tsv("file.tsv") Also **read_table()**.

write_file(x = "a\tb\tc\n1\t2\t3\n4\t5\tNA", path = "file.tsv")

USEFUL ARGUMENTS

Example file

```
a,b,c
1,2,3
4,5,NA
```

write_file("a,b,c\n1,2,3\n4,5,NA", file.csv)
f <- "file.csv"

1	2	3
4	5	NA

Skip lines
read_csv(f, skip = 1)

No header

read_csv(f, col_names = FALSE)

A	B	C
1	2	3

Read in a subset
read_csv(f, n_max = 1)

Provide header

read_csv(f, col_names = c("x", "y", "z"))

x	y	z
A	B	C
1	2	3
4	5	NA

A	B	C
NA	2	3
4	5	NA

Missing Values
read_csv(f, na = c("1", ""))

Read Non-Tabular Data

Read a file into a single string

read_file(file, locale = default_locale())

Read each line into its own string

read_lines(file, skip = 0, n_max = -1L, na = character(), locale = default_locale(), progress = interactive())

Read Apache style log files

read_log(file, col_names = FALSE, col_types = NULL, skip = 0, n_max = -1, progress = interactive())

Read a file into a raw vector

read_file_raw(file)

Read each line into a raw vector

read_lines_raw(file, skip = 0, n_max = -1L, progress = interactive())

Data types

readr functions guess the types of each column and convert types when appropriate (but will NOT convert strings to factors automatically).

A message shows the type of each column in the result.

```
## Parsed with column specifications:
## cols(
##   age = col_integer(),
##   sex = col_character(),
##   earn = col_double()
## )
```

earn is a double (numeric)

sex is a character

1. Use **problems()** to diagnose problems.

x <- read_csv("file.csv"); problems(x)

2. Use a **col_** function to guide parsing.

- **col_guess()** - the default
- **col_character()**
- **col_double()**, **col_euro_double()**
- **col_datetime()**(format = "") Also **col_date()**(format = "")
- **col_factor()**(levels, ordered = FALSE)
- **col_integer()**
- **col_logical()**
- **col_number()**, **col_numeric()**
- **col_skip()**

**x <- read_csv("file.csv", col_types = cols(
 A = col_double(),
 B = col_logical(),
 C = col_factor()))**

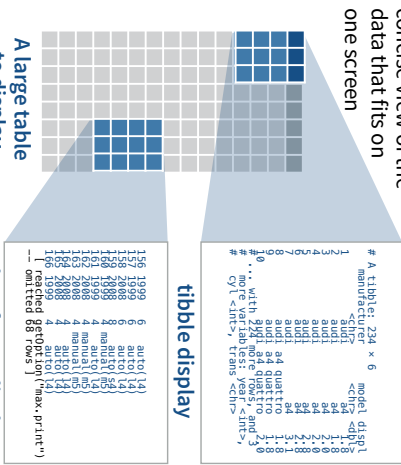
3. Else, read in as character vectors then parse with a **parse_** function.

- **parse_guess()**
 - **parse_character()**
 - **parse_datetime()** Also **parse_date()** and **parse_time()**
 - **parse_double()**
 - **parse_factor()**
 - **parse_integer()**
 - **parse_logical()**
 - **parse_number()**
- x\$A <- parse_number(x\$A)**

Tibbles - an enhanced data frame

The **tibble** package provides a new S3 class for storing tabular data, the tibble. Tibbles inherit the data frame class, but improve three behaviors:

- **Subsetting** - `[` always returns a new tibble, `[]` and `$` always return a vector.
- **No partial matching** - You must use full column names when subsetting
- **Display** - When you print a tibble, R provides a concise view of the data that fits on one screen



- Control the default appearance with options: **options**(tibble.print_max = n, tibble.print_min = m, tibble.width = lmf)
- View full data set with **View()** or **glimpse()**
- Revert to data frame with **as.data.frame()**

CONSTRUCT A TIBBLE IN TWO WAYS

tibble(...)
Construct by columns.
`tibble(x = 1:3, y = c("a", "b", "c"))`

tribble(...)
Construct by rows.
`tribble(~x, ~y, 1, "a", 2, "b", 3, "c")`

Both make this tibble

```
A tibble: 3 x 2
  x     y
  <int> <chr>
1     1  a
2     2  b
3     3  c
```

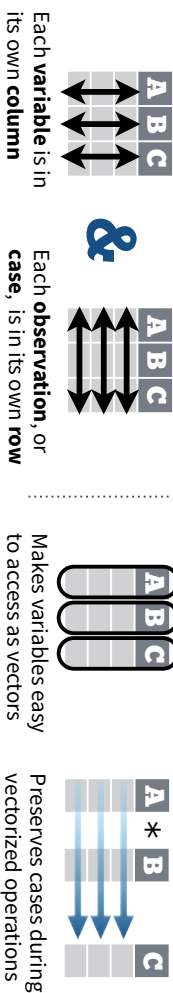
as_tibble(x, ...) Convert data frame to tibble.

enframe(x, name = "name", value = "value")
Convert named vector to a tibble

is_tibble(x) Test whether x is a tibble.

Tidy Data with tidyr

Tidy data is a way to organize tabular data. It provides a consistent data structure across packages. A table is tidy if:



Reshape Data - change the layout of values in a table

Use **gather()** and **spread()** to reorganize the values of a table into a new layout.

gather(data, key, value, ..., na.rm = FALSE, convert = FALSE, factor_key = FALSE)
`gather()` moves column names into a key column, gathering the column values into a single value column.

country	1999	2000
A	0.7K	2K
B	37K	80K
C	212K	213K

spread(data, key, value, fill = NA, convert = FALSE, drop = TRUE, sep = NULL)
`spread()` moves the unique values of a key column into the column names, spreading the values of a value column across the new columns.

country	year	cases	pop
A	1999	0.7K	19M
A	1999	pop	19M
A	2000	cases	2K
A	2000	pop	20M
B	1999	cases	37K
B	1999	pop	172M
B	2000	cases	80K
B	2000	pop	174M
C	1999	cases	212K
C	1999	pop	1T
C	2000	cases	213K
C	2000	pop	1T

Handle Missing Values

drop_na(data, ...)
Drop rows containing NAs in ... columns.

fill(data, ..., direction = c("down", "up"))
Fill in NAs in ... columns with most recent non-NA values.

replace_na(data, replace = list(...))
Replace NAs by column.

drop_na(x2)

x1	x2
A	1
B	NA
C	NA
D	3
E	NA

fill(x, x2)

x1	x2
A	1
B	NA
C	1
D	3
E	NA

replace_na(x, list(x2 = 2))

x1	x2
A	1
B	2
C	2
D	3
E	2

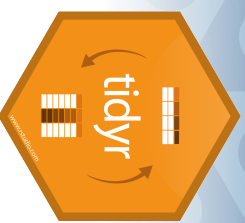
Expand Tables - quickly create tables with combinations of values

complete(data, ..., fill = list())
Adds to the data missing combinations of the values of the variables listed in ...

expand(data, ...)
Create new tibble with all possible combinations of the values of the variables listed in ...

Split Cells

Use these functions to split or combine cells into individual, isolated values.



separate(data, col, into, sep = "[r|a|num:]", +, remove = TRUE, convert = FALSE, extra = "warn", fill = "warn", ...)
Separate each cell in a column to make several columns.

separate_rows(tables3, rate, sep = "/")
`into = c("cases", "pop")`

country	year	rate
A	1999	0.7K/19M
A	2000	2K/20M
B	1999	37K/172M
B	2000	80K/174M
C	1999	212K/1T
C	2000	213K/1T

separate_rows(tables3, rate, sep = "/")
`into = c("cases", "pop")`

country	year	cases	pop
A	1999	0.7K	19M
A	2000	2K	20M
B	1999	37K	172M
B	2000	80K	174M
C	1999	212K	1T
C	2000	213K	1T

separate_rows(data, ..., sep = "[r|a|num:]", +, convert = FALSE)
Separate each cell in a column to make several rows.

country	year	rate
A	1999	0.7K/19M
A	2000	2K/20M
B	1999	37K/172M
B	2000	80K/174M
C	1999	212K/1T
C	2000	213K/1T

separate_rows(tables3, rate, sep = "/")

country	year	rate
A	1999	0.7K
A	1999	19M
A	2000	2K
A	2000	20M
B	1999	37K
B	1999	172M
B	2000	80K
B	2000	174M
C	1999	212K
C	1999	1T
C	2000	213K
C	2000	1T

unite(data, col, ..., sep = "_", remove = TRUE)
Collapse cells across several columns to make a single column.

separate_rows(tables3, rate, sep = "/")

unite(tables5, century, year, col = "year", sep = "")

country	century	year
Afghan	19	99
Afghan	20	00
Brazil	19	99
Brazil	20	00
China	19	99
China	20	00

unite(tables5, century, year, col = "year", sep = "")

country	year
Afghan	1999
Afghan	2000
Brazil	1999
Brazil	2000
China	1999
China	2000