

# Debugging

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RStudio

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<https://whattheyforgot.org/debugging-r-code.html>

# Why Debug?



Error in names[[i]] : subscript out of  
bounds

1. google *exact* error message
2. Keyword search [community.rstudio.com](https://community.rstudio.com)
3. Stackoverflow - [r] tag

- `traceback()`
- `print()`, `cat()`, `message()`
- `browser()`
- `debug()` / `trace()` / `recover()`

# traceback()

```
f <- function(x) x + 1
g <- function(x) f(x)
g("a")
#> Error in x + 1: non-numeric argument to binary operator
traceback()
#> 2: f(x) at #1
#> 1: g("a")
```

# traceback()

```
trceback()  
#> Error in trceback(): could not find function "trceback"  
  
# in .Rprofile  
tb <- traceback  
  
options(error = traceback)
```



# print()

```
f <- function(x) {  
  print(x)  
  x + 1  
}  
g <- function(x) f(x)  
g("a")  
#> [1] "a"  
#> Error in x + 1: non-numeric argument to binary operator
```

# str()

```
f <- function(x) {  
  str(x)  
  x + 1  
}  
g <- function(x) f(x)  
g("a")  
#> chr "a"  
#> Error in x + 1: non-numeric argument to binary operator
```

# browser()

- ls()
- str(), print()
- n - next statement
- where - stack trace
- c - continue
- Q - quit and stop

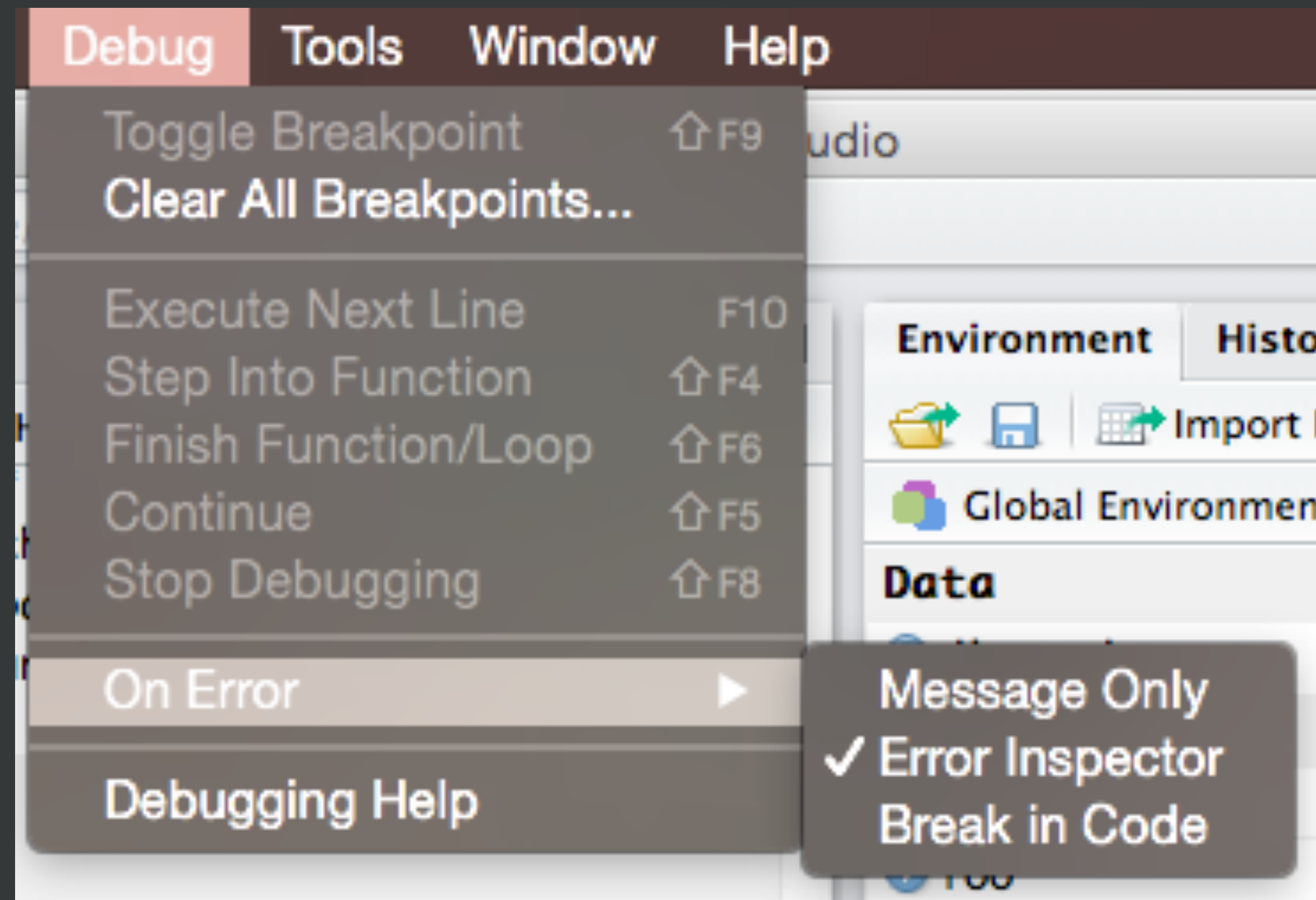
# Debugging in RStudio

## breakpoints

```
18 best <- 0
19 for (x in 100:999) {
20   for (y in x:999) {
21     candidate <- x * y
22     if (candidate > best && palindrome(candidate)) {
23       best <- candidate
24     }
25   }
26 }
```

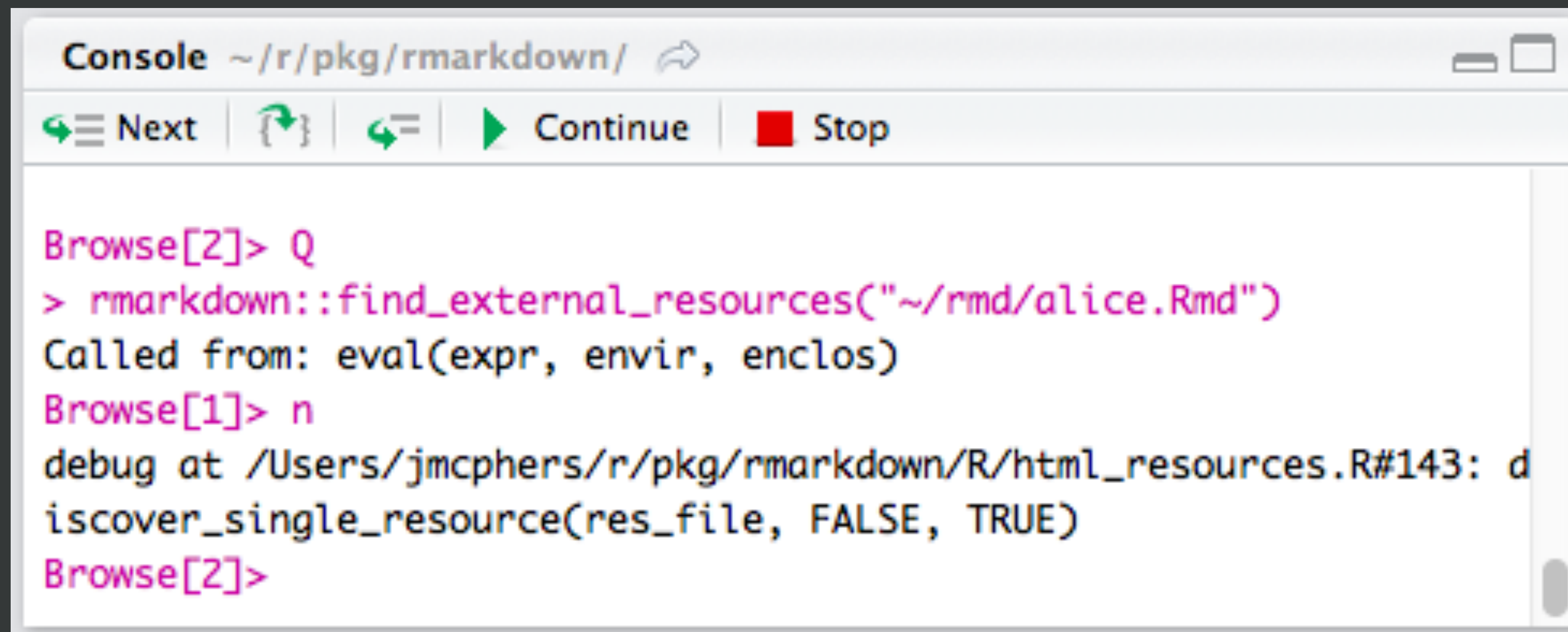
# Debugging in RStudio

## Debug on Error



# Debugging in RStudio

## Debug console

A screenshot of the RStudio Debug Console window. The window title is "Console ~/r/pkg/rmarkdown/". The toolbar contains buttons for "Next" (green left arrow), a step-through icon (green arrow with a bracket), an equals icon (green arrow), "Continue" (green right arrow), and "Stop" (red square). The console text shows a sequence of commands and debug messages: "Browse[2]> Q", "> rmarkdown::find\_external\_resources(\"~/rmd/alice.Rmd\")", "Called from: eval(expr, envir, enclos)", "Browse[1]> n", "debug at /Users/jmcphers/r/pkg/rmarkdown/R/html\_resources.R#143: d", "discover\_single\_resource(res\_file, FALSE, TRUE)", and "Browse[2]>".

```
Console ~/r/pkg/rmarkdown/

Next | { } | = | Continue | Stop

Browse[2]> Q
> rmarkdown::find_external_resources("~/rmd/alice.Rmd")
Called from: eval(expr, envir, enclos)
Browse[1]> n
debug at /Users/jmcphers/r/pkg/rmarkdown/R/html_resources.R#143: d
discover_single_resource(res_file, FALSE, TRUE)
Browse[2]>
```

recover()

like browser()

full call stack

```
options(error = recover)
```

[https://whattheyforgot.org/activities/21\\_debugging-r-01.R](https://whattheyforgot.org/activities/21_debugging-r-01.R)



# Debugging others' code

- Download / `devtools::load_all()` / `source()`
- `recover()`
- `debug()`
- `trace()`

debug()

debug(ggplot2::ggplot)

debug(ggplot2:::set\_last\_plot)

undebug(ggplot2::ggplot)

# trace()

```
trace(print)
```

```
print(1)
```

```
#> trace: print(1)
```

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

```
trace(print, browser)
```

```
#> Tracing function "print" in package "base"
```

# trace()

```
trace(print, quote(if (is.numeric(x) && x >= 3) cat("hi\n")),  
print = FALSE)  
#> Tracing function "print" in package "base"  
#> [1] "print"  
print(1)  
#> [1] 1  
print(3)  
#> hi  
#> [1] 3
```

```
trace(print.data.frame, browser, at = 4)
#> Tracing function "print.data.frame" in package "base"
#> [1] "print.data.frame"
body(print.data.frame)
#> {
#>     n <- length(row.names(x))
#>     if (length(x) == 0L) {
#>         cat(sprintf(ngettext(n, "data frame with 0 columns
#> [sic]
#>         print(m, ..., quote = quote, right = right)
#>     }
#>     {
#>         .doTrace(browser(), "step 4")
#>         invisible(x)
#>     }
#> }
```

[https://whattheyforgot.org/activities/21\\_debugging-r-02.R](https://whattheyforgot.org/activities/21_debugging-r-02.R)

# Read the source

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<https://whattheyforgot.org/read-the-source.html>



**READ THE**

**SOURCE**

**LUKE**



(almost) all source on GitHub

[github.com/search](https://github.com/search)

<https://github.com/wch/r-source>

<https://github.com/cran>

<https://github.com/wch/r-source>

`src/main` - C code

`src/library/*` - R code

`doc/manual` - R manuals

[https://whattheyforgot.org/activities/22\\_read-source-01.R](https://whattheyforgot.org/activities/22_read-source-01.R)



# google cran pkgname

- URL
- BugReports

# <https://github.com/cran>

## devtools: Tools to Make Developing R Packages Easier

Collection of package development tools.

Version: 1.13.6  
Depends: R (≥ 3.0.2)  
Imports: [http](#) (≥ 0.4), utils, tools, methods, [memoise](#) (≥ 1.0.0), [whisker](#), [digest](#), [R6](#)  
Suggests: [curl](#) (≥ 0.9), [crayon](#), [testthat](#) (≥ 1.0.2), [BiocInstaller](#), [Rcpp](#) (≥ 0.10.0), [RcppEigen](#)  
Published: 2018-06-27  
Author: Hadley Wickham [aut], Jim Hester [aut, cre], Winston Chang [aut], RStudio [cre]  
Maintainer: Jim Hester <james.hester@rstudio.com>  
BugReports: <https://github.com/r-lib/devtools/issues>  
License: [GPL-2](#) | [GPL-3](#) [expanded from: GPL (≥ 2)]  
URL: <https://github.com/r-lib/devtools>  
NeedsCompilation: no  
Materials: [README](#) [NEWS](#)  
CRAN checks: [devtools results](#)

### Downloads:

Reference manual: [devtools.pdf](#)  
Vignettes: [Devtools dependencies](#)  
Package source: [devtools 1.13.6.tar.gz](#)  
Windows binaries: r-devel: [devtools 1.13.6.zip](#), r-release: [devtools 1.13.6.zip](#), r-oldrel: [devtools 1.13.6.zip](#)  
OS X binaries: r-release: [devtools 1.13.6.tgz](#), r-oldrel: [devtools 1.13.6.tgz](#)  
Old sources: [devtools archive](#)

- DESCRIPTION - metadata
- README.md - readme
- R/ - R code
- man/ - Documentation (usually not what you want)
  - #' Roxygen comment
- src/ - Compiled code
- vignettes/ - Long form documentation

[https://whattheyforgot.org/activities/22\\_read-source-02.R](https://whattheyforgot.org/activities/22_read-source-02.R)