

Package ‘cpp11’

September 22, 2021

Title A C++11 Interface for R's C Interface

Version 0.4.0

Description Provides a header only, C++11 interface to R's C interface. Compared to other approaches 'cpp11' strives to be safe against long jumps from the C API as well as C++ exceptions, conform to normal R function semantics and supports interaction with 'ALTREP' vectors.

License MIT + file LICENSE

URL <https://cpp11.r-lib.org>, <https://github.com/r-lib/cpp11>

BugReports <https://github.com/r-lib/cpp11/issues>

Suggests bench, brio, callr, cli, covr, decor, desc, ggplot2, glue, knitr, lobstr, mockery, progress, rmarkdown, scales, Rcpp, testthat, tibble, utils, vctrs, withr

VignetteBuilder knitr

Config/testthat/edition 3

Config/Needs/cpp11/cpp_register brio, cli, decor, desc, glue, tibble, vctrs

Encoding UTF-8

RoxygenNote 7.1.1

SystemRequirements C++11

NeedsCompilation no

Author Jim Hester [aut, cre] (<<https://orcid.org/0000-0002-2739-7082>>),
Romain François [ctb],
Benjamin Kietzman [ctb],
RStudio [cph, fnd]

Maintainer Jim Hester <jim.hester@rstudio.com>

Repository CRAN

Date/Publication 2021-09-22 08:50:10 UTC

R topics documented:

| | |
|--------------|---|
| cpp_register | 2 |
| cpp_source | 3 |
| cpp_vendor | 5 |

| | |
|--------------|----------|
| Index | 7 |
|--------------|----------|

| | |
|--------------|--|
| cpp_register | <i>Generates wrappers for registered C++ functions</i> |
|--------------|--|

Description

Functions decorated with `[[cpp11::register]]` in files ending in `.cc`, `.cpp`, `.h` or `.hpp` will be wrapped in generated code and registered to be called from R.

Usage

```
cpp_register(path = ".", quiet = FALSE)
```

Arguments

| | |
|-------|--|
| path | The path to the package root directory |
| quiet | If TRUE suppresses output from this function |

Details

Note registered functions will not be *exported* from your package unless you also add a `@export roxygen2` directive for them.

In order to use `cpp_register()` the `cli`, `decor`, `desc`, `glue`, `tibble` and `vctrs` packages must also be installed.

Value

The paths to the generated R and C++ source files (in that order).

Examples

```
# create a minimal package
dir <- tempfile()
dir.create(dir)

writeLines("Package: testPkg", file.path(dir, "DESCRIPTION"))
writeLines("useDynLib(testPkg, .registration = TRUE)", file.path(dir, "NAMESPACE"))

# create a C++ file with a decorated function
dir.create(file.path(dir, "src"))
writeLines("[[cpp11::register]] int one() { return 1; }", file.path(dir, "src", "one.cpp"))
```

```
# register the functions in the package
cpp_register(dir)

# Files generated by registration
file.exists(file.path(dir, "R", "cpp11.R"))
file.exists(file.path(dir, "src", "cpp11.cpp"))

# cleanup
unlink(dir, recursive = TRUE)
```

cpp_source

Compile C++ code

Description

`cpp_source()` compiles and loads a single C++ file for use in R. `cpp_function()` compiles and loads a single function for use in R. `cpp_eval()` evaluates a single C++ expression and returns the result.

Usage

```
cpp_source(
  file,
  code = NULL,
  env = parent.frame(),
  clean = TRUE,
  quiet = TRUE,
  cxx_std = Sys.getenv("CXX_STD", "CXX11"),
  dir = tempfile()
)

cpp_function(
  code,
  env = parent.frame(),
  clean = TRUE,
  quiet = TRUE,
  cxx_std = Sys.getenv("CXX_STD", "CXX11")
)

cpp_eval(
  code,
  env = parent.frame(),
  clean = TRUE,
  quiet = TRUE,
  cxx_std = Sys.getenv("CXX_STD", "CXX11")
)
```

Arguments

| | |
|---------|---|
| file | A file containing C++ code to compile |
| code | If non-null, the C++ code to compile |
| env | The R environment where the R wrapping functions should be defined. |
| clean | If TRUE, cleanup the files after sourcing |
| quiet | If 'TRUE', do not show compiler output |
| cxx_std | The C++ standard to use, the CXX_STD make macro is set to this value. The default value queries the CXX_STD environment variable, or uses 'CXX11' if unset. |
| dir | The directory to store the generated source files. tempfile() is used by default. The directory will be removed if clean is TRUE. |

Details

Within C++ code you can use `[[cpp11::linking_to("pkgxyz")]]` to link to external packages. This is equivalent to putting those packages in the `LinkingTo` field in a package DESCRIPTION.

Value

For `cpp_source()` and `[cpp_function()]` the results of `dyn.load()` (invisibly). For `[cpp_eval()]` the results of the evaluated expression.

Examples

```
cpp_source(
  code = '#include "cpp11/integers.hpp"

  [[cpp11::register]]
  int num_odd(cpp11::integers x) {
    int total = 0;
    for (int val : x) {
      if ((val % 2) == 1) {
        ++total;
      }
    }
    return total;
  }
')
```

```
num_odd(as.integer(c(1:10, 15, 23)))
```

```
if (interactive() && require("progress")) {

  cpp_source(
    code = '
#include <cpp11/R.hpp>
#include <RProgress.h>
```

```

[[cpp11::linking_to("progress")]]

[[cpp11::register]] void
show_progress() {
    RProgress::RProgress pb("Processing [:bar] ETA: :eta");

    pb.tick(0);
    for (int i = 0; i < 100; i++) {
        usleep(2.0 / 100 * 1000000);
        pb.tick();
    }
}
')

show_progress()
}

```

cpp_vendor

Vendor the cpp11 dependency

Description

Vendoring is the act of making your own copy of the 3rd party packages your project is using. It is often used in the go language community.

Usage

```
cpp_vendor(path = ".")
```

Arguments

path The path to the package root directory

Details

This function vendors cpp11 into your package by copying the cpp11 headers into the `inst/include` folder of your package and adding `'cpp11 version: XYZ'` to the top of the files, where XYZ is the version of cpp11 currently installed on your machine.

If you choose to vendor the headers you should *remove* `LinkingTo: cpp11` from your DESCRIPTION.

Note: vendoring places the responsibility of updating the code on **you**. Bugfixes and new features in cpp11 will not be available for your code until you run `vector_cpp11()` again.

Value

The file path to the vendored code (invisibly).

Examples

```
# create a new directory
dir <- tempfile()
dir.create(dir)

# vendor the cpp11 headers into the directory
cpp_vendor(dir)

list.files(file.path(dir, "inst", "include", "cpp11"))

# cleanup
unlink(dir, recursive = TRUE)
```

Index

`cpp_eval (cpp_source)`, 3
`cpp_eval()`, 3
`cpp_function (cpp_source)`, 3
`cpp_function()`, 3
`cpp_register`, 2
`cpp_source`, 3
`cpp_source()`, 3, 4
`cpp_vendor`, 5

`dyn.load()`, 4