Package ‘R.utils’

August 27, 2018

Version 2.7.0
Depends R (>= 2.14.0), R.oo (>= 1.21.0)
Imports methods, utils, tools, R.methodsS3 (>= 1.7.1)
Suggests digest (>= 0.6.10)
Title Various Programming Utilities
Author Henrik Bengtsson [aut, cre, cph]
Maintainer Henrik Bengtsson <henrikb@braju.com>
Description Utility functions useful when programming and developing R packages.
License LGPL (>= 2.1)
LazyLoad TRUE
URL https://github.com/HenrikBengtsson/R.utils
BugReports https://github.com/HenrikBengtsson/R.utils/issues
RoxygenNote 6.1.0
NeedsCompilation no
Repository CRAN
Date/Publication 2018-08-27 08:24:26 UTC

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Utility functions useful when programming and developing R packages.

Warning: The Application Programming Interface (API) of the classes and methods in this package may change. Classes and methods are considered either to be stable, or to be in beta or alpha (pre-beta) stage. See list below for details.

The main reason for publishing this package on CRAN although it lacks a stable API, is that its methods and classes are used internally by other packages on CRAN that the author has published.

For package history, see showHistory(R.utils).

Requirements

This package requires the R.oo package [1].

Installation and updates

To install this package do:

install.packages("R.utils")

To get started

- **Arguments**[alpha] Methods for common argument processing.
- **Assert**[alpha] Methods for assertion of values and states.
- **GString**[alpha] A character string class with methods for simple substitution.
- **Java**[beta] Reads and writes Java streams.
- **Options**[alpha] Tree-structured options queried in a file-system like manner.
• **Settings**[alpha] An Options class for reading and writing package settings.
• **ProgressBar**[beta] Text-based progress bar.
• **FileProgressBar**[beta] A ProgressBar that reports progress as file size.
• **System**[alpha] Methods for access to system.
• **Verbose**[alpha] A class for verbose and log output. Utilized by the VComments and LComments classes.
• **SmartComments, VComments, LComments**[alpha] Methods for preprocessing source code comments of certain formats into R code.

In addition to the above, there is a large set of function for file handling such as support for reading/following Windows Shortcut links, but also other standalone utility functions. See package index for a list of these. These should also be considered to be in alpha or beta stage.

### How to cite this package

Whenever using this package, please cite [1] as


### Wishlist

Here is a list of features that would be useful, but which I have too little time to add myself. Contributions are appreciated.

• Write a TclTkProgressBar class.
• Improve/stabilize the GString class.
• Mature the SmartComments classes. Also add AComments and PComments for assertion and progress/status comments.

If you consider implement some of the above, make sure it is not already implemented by downloading the latest "devel" version!

### License

The releases of this package is licensed under LGPL version 2.1 or newer.

The development code of the packages is under a private licence (where applicable) and patches sent to the author fall under the latter license, but will be, if incorporated, released under the "release" license above.

### References

addFinalizerToLast

Modifies .Last() to call 'finalizeSession()

Description

Modifies .Last() to call 'finalizeSession() before calling the default .Last() function.

Note that .Last() is not guaranteed to be called when the R session finished. For instance, the user may quit R by calling quit(runLast=FALSE) or run R in batch mode.

Note that this function is called when the R.utils package is loaded.

Usage

```r
## Default S3 method:
addFinalizerToLast(...)  
```

Arguments

... Not used.

Value

Returns (invisibly) TRUE if .Last() was modified, otherwise FALSE.

Author(s)

Henrik Bengtsson

See Also

onSessionExit().
### Arguments

**Static class to validate and process arguments**

---

#### Description

Package: R.utils

**Class Arguments**

```java
package R.utils;

public static class Arguments extends Object {
    // Class implementation
}
```

**Directly known subclasses:**

- `getCharacter` - Coerces to a character vector and validates.
- `getCharacters` - Coerces to a character vector and validates.
- `getDirectory` - Coerces to a directory.
- `getDouble` - Coerces to a double vector and validates.
- `getDoubles` - Coerces to a double vector and validates.
- `getEnvironment` - Gets an existing environment.
- `getFilename` - Gets and validates a filename.
- `getIndex` - Coerces to an index vector and validates.
- `getIndices` - Coerces to an index vector and validates.
- `getInstanceOf` - Gets an instance of the object that is of a particular class.
- `getInteger` - Coerces to an integer vector and validates.
- `getIntegers` - Coerces to an integer vector and validates.
- `getLogical` - Coerces to a logical vector and validates.
- `getLogicals` - Coerces to a logical vector and validates.
- `getNumeric` - Coerces to a numeric vector and validates.
- `getNumerics` - Coerces to a numeric vector and validates.
- `getReadablePath` - Gets a readable pathname.
- `getReadablePathname` - Gets a readable pathname.
- `getReadablePathnames` - Gets a readable pathname.
- `getRegularExpression` - Gets a valid regular expression pattern.
- `getVector` - Validates a vector.
- `getVerbose` - Coerces to Verbose object.
as.character.binmode

getWritablePath -
getWritablePathname  Gets a writable pathname.

Methods inherited from Object:
$, $<-, [[, [[<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)
Henrik Bengtsson

---

as.character.binmode  Converts a binary/octet/hexadecimal number into a string

Description
Converts a binary/octet/hexadecimal number into a string.

Usage

```r
## S3 method for class 'binmode'
as.character(x, ...)
```

Arguments

- `x` Object to be converted.
  - `...` Not used.

Value

Returns a `character`.

Author(s)

Henrik Bengtsson

See Also

as.character.octmode(), cf. `octmode.intToBin()` (incl. `intToOct()` and `intToHex()`).
The Assert class

Package: R.utils
Class Assert

Object

---

~| Assert

---

Directly known subclasses:

public static class Assert extends Object

Usage

Assert(...)

Arguments

... Not used.

Fields and Methods

Methods:

- check: Static method asserting that a generic condition is true.
- inherits: -
- inheritsFrom: Static method asserting that an object inherits from of a certain class.
- isMatrix: Static method asserting that an object is a matrix.
- isScalar: Static method asserting that an object is a single value.
- isVector: Static method asserting that an object is a vector.

Methods inherited from Object:
S, $\langle$, $\langle$, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstanceationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save
attachLocally.list

Assigns an objects elements locally

Description

Assigns an objects elements locally.

Usage

```r
## S3 method for class 'list'
attachLocally(object, fields=NULL, excludeFields=NULL, overwrite=TRUE, 
             envir=parent.frame(), ...)
```

Arguments

- `object`: An object with named elements such as an `environment`, a `list`, or a `data.frame`.
- `fields`: A `character vector` specifying elements to be copied. If `NULL`, all elements are considered.
- `excludeFields`: A `character vector` specifying elements not to be copied. This has higher priority than `fields`.
- `overwrite`: If `FALSE`, fields that already exists will not be copied.
- `envir`: The `environment` where elements are copied to.
- `...`: Not used.

Value

Returns (invisibly) a `character vector` of the fields copied.

Author(s)

Henrik Bengtsson

See Also

`attachLocally()` of class `Object`. `attach()`.
callHooks

Examples

```r
foo <- function(object) {
  cat("Local objects in foo():\n")
  print(ls())

  attachLocally(object)

  cat("\nLocal objects in foo():\n")
  print(ls())

  for (name in ls()) {
    cat("\nObject ", name, "\n", sep="")
    print(get(name, inherits=FALSE))
  }
}
}

a <- "A string"
l <- list(a=1:10, msg="Hello world", df=data.frame(a=NA, b=2))
foo(l)
print(a)
```

---

callHooks  

*Call hook functions by hook name*

Description

Call hook functions by hook name.

Usage

```r
## Default S3 method:
callHooks(hookName, ..., removeCalledHooks=FALSE)
```

Arguments

- **hookName**  
  A `character` string of the hook name.
- **...**  
  Argument passed to each hook function.
- **removeCalledHooks**  
  If `TRUE`, called hook functions are removed, otherwise not.

Value

Returns (invisibly) whatever `callHooks.list()` returns.

Author(s)

Henrik Bengtsson
See Also

Internally, after retrieving hook functions, `callHooks.list()` is called.

Examples

```r
# Example 1
# First, clean up if called more than once
setHook("myFunction.onEnter", NULL, action="replace")
setHook("myFunction.onExit", NULL, action="replace")

runConference <- function(...) {
  callHooks("myFunction.onEnter")
  cat("Speaker A: Hello there.\n")
  callHooks("myFunction.onExit")
}

setHook("myFunction.onEnter", function(...) {
  cat("Chair: Welcome to our conference.\n")
})

setHook("myFunction.onEnter", function(...) {
  cat("Chair: Please welcome Speaker A!\n")
})

setHook("myFunction.onExit", function(...) {
  cat("Chair: Please thanks Speaker A!\n")
})

runConference()

# Example 2
# setHook("randomNumber", NULL, action="replace")
setHook("randomNumber", rnorm) # By function
setHook("randomNumber", "rexp") # By name
setHook("randomNumber", "runif") # Non-existing name
setHook("randomNumber", .GlobalEnv) # Not a function

res <- callHooks("randomNumber", n=1)
str(res)
cat("Number of hooks: ", length(res), "\n");
isErroneous <- unlist(lapply(res, FUN=function(x) !is.null(x$exception)));
cat("Erroneous hooks: ", sum(isErroneous), "\n");
```
callHooks.function

Call hook functions

Call hook functions.

## Usage

```r
## S3 method for class 'function'
callHooks(hooks, ...)
```

### Arguments

- **hooks**
  - A function or a list of hook functions or names of such.
- **...**
  - Argument passed to each hook function.

### Value

Returns (invisibly) a list that is named with hook names, if possible. Each element in the list is in turn a list with three elements: `fcn` is the hook function called, `result` is its return value, and `exception` is the exception caught or `NULL`.

### Author(s)

Henrik Bengtsson

### See Also

See `callHooks()` to call hook function by name.

---

capitalize

**Capitalizes/decapitalizes each character string in a vector**

## Description

Capitalizes/decapitalized (making the first letter upper/lower case) of each character string in a vector.

## Usage

```r
## Default S3 method:
capitalize(str, ...)
## Default S3 method:
decapitalize(str, ...)
```
Arguments

str A vector of character strings to be capitalized.

...

Value

Returns a vector of character strings of the same length as the input vector.

Author(s)

Henrik Bengtsson

See Also

toCamelCase.

Examples

```
words <- strsplit("Hello w0rld", " ")[1];
cat(paste(toupper(words), collapse= " "), "\n") # "HELLO WORLD"
cat(paste(tolower(words), collapse=" "), "\n") # "hello world"
cat(paste(capitalize(words), collapse=" "), "\n") # "Hello World"
cat(paste(decapitalize(words), collapse=" "), "\n") # "hello w0rld"

# Sanity checks
stopifnot(paste(toupper(words), collapse= " ") == "HELLO WORLD")
stopifnot(paste(tolower(words), collapse= " ") == "hello world")
stopifnot(paste(capitalize(words), collapse=" ") == "Hello World")
stopifnot(paste(decapitalize(words), collapse=" ") == "hello w0rld")
```

---

captureOutput Evaluate an R expression and captures the output

Description

Evaluate an R expression and captures the output.

Usage

captureOutput(expr, file=NULL, append=FALSE, collapse=NULL, envir=parent.frame())
Arguments

expr  The R expression to be evaluated.
file  A file name or a connection to where the output is directed. Alternatively, if `NULL` the output is captured to and returned as a character vector.
append  If TRUE, the output is appended to the file or the (unopened) connection, otherwise it overwrites.
collapse  A character string used for collapsing the captured rows. If `NULL`, the rows are not collapsed.
envir  The environment in which the expression is evaluated.

Details

This method imitates `capture.output` with the major difference that it captures strings via a `raw` connection rather than via internal strings. The latter becomes exponentially slow for large outputs [1,2].

Value

Returns captured output as a character vector.

Author(s)

Henrik Bengtsson

References


See Also

Internally, `eval()` is used to evaluate the expression. and `capture.output` to capture the output.

Examples

```r
# captureOutput() is much faster than capture.output()
# for large outputs when capturing to a string.
for (n in c(10e3, 20e3, 30e3, 40e3)) {
  printf("n=%d\n", n)
  x <- rnorm(n)
  t0 <- system.time({
    bfr0 <- capture.output(print(x))
  })
  print(t0)
```

cmdArgs <- system.time(
  bfr <- captureOutput(print(x))
) print(t1) print(t1/t0)

bfr2n <- captureOutput(print(x), collapse="\n") bfr2r <- captureOutput(print(x), collapse="\r")

stopifnot(identical(bfr, bfr@))
} # for (n ...)

---

**cmdArgs**

*Simple access to parsed command-line arguments*

**Description**

Simple access to parsed command-line arguments.

**Usage**

```
cmdArgs(args=NULL, names=NULL, unique=TRUE, ..., .args=NULL)
cmdArg(...)
```

**Arguments**

- **args**
  
  A named *list* of arguments.

- **names**
  
  A *character vector* specifying the arguments to be returned. If *NULL*, all arguments are returned.

- **unique**
  
  If *TRUE*, only unique arguments are returned.

- **...**
  
  For `cmdArgs()`, additional arguments passed to `commandArgs()`, e.g. *defaults* and *always*. For `cmdArg()`, named arguments name and default, where name must be a *character* string and default is an optional default value (if not given, it's *NULL*). Alternatively, name and default can be given as a named argument (e.g. `n=42`).

- **.args**
  
  (advanced/internal) A named *list* of parsed command-line arguments.

**Value**

`cmdArgs()` returns a named *list* with command-line arguments. `cmdArg()` return the value of the requested command-line argument.

**Coercing to non-character data types**

The value of each command-line argument is returned as a *character* string, unless an argument share name with ditto in the (optional) arguments always and default in case the retrieved value is coerced to that of the latter. Finally, remaining character string command-line arguments are coerced to *numerics* (via `as.numeric()`), if possible, that is unless the coerced value becomes *NA*. 
Author(s)
Henrik Bengtsson

See Also
Internally, `commandArgs()` is used.

Examples
```r
args <- cmdArgs()
cat("User command-line arguments used when invoking R: \n")
str(args)

# Retrieve command line argument 'n', e.g. '-n 13' or '--n=13'
n <- cmdArg("n", 42L)
printf("Argument n=%d\n", n)

# Short version doing the same
n <- cmdArg(n=42L)
printf("Argument n=%d\n", n)
```

Description

Creates a vector of column classes used for tabular reading based on a compact format string.

Usage
```r
## Default S3 method:
colClasses(fmt, ...)
```

Arguments

- `fmt` A character string specifying the column-class format. This string is first translated by `sprintf()`.
- `...` Optional arguments for the `sprintf()` translation.

Value

Returns a vector of character strings.

Author(s)
Henrik Bengtsson
compressFile

Compressing and decompressing files

Description

Compressing and decompressing files such as gzip:ed and bzip2:ed files.

NOTE: The default (remove=TRUE) behavior is that the input file is removed after that the output file is fully created and closed.

See Also

read.table.

Examples

# All predefined types
print(colClasses("?-cdflnrzDP"))
## [1] "NULL" "NA" "character" "double"
## [5] "factor" "integer" "logical" "numeric"
## [9] "raw" "complex" "Date" "POSIXct"

# A string in column 1, integers in column 4 and 5, rest skipped
print(colClasses("c--ii-----"))
## [1] "character" "NULL" "NULL" "integer"
## [5] "integer" "NULL" "NULL" "NULL"
## [9] "NULL"

# Repeats and custom column classes
c1 <- colClasses("3c(MyClass)3(foo)"
print(c1)
## [1] "character" "character" "character" "MyClass"
## [5] "foo" "foo" "foo"

# Passing repeats and class names using sprintf() syntax
c2 <- colClasses("%dc(Ks)%d(foo)", 3, "MyClass", 3)
stopifnot(identical(c1, c2))

# Repeats of a vector of column classes
c3 <- colClasses("3(MyClass,c)"
print(c3)
## [1] "MyClass" "character" "MyClass" "character"
## [4] "MyClass" "character"

# Large number repeats
c4 <- colClasses("321(MyClass,c,i,d)"

c5 <- rep(c("MyClass", "character", "integer", "double"), times=321)
stopifnot(identical(c4, c5))
Usage

```r
## Default S3 method:
compressFile(filename, destname=sprintf("%s.%s", filename, ext), ext, FUN,
temporary=FALSE, skip=FALSE, overwrite=FALSE, remove=TRUE, BFR.SIZE=1e+07, ...)
## Default S3 method:
decompressFile(filename, destname=gsub(sprintf("[.]*$", ext), ",", filename,
    ignore.case = TRUE), ext, FUN, temporary=FALSE, skip=FALSE, overwrite=FALSE,
    remove=TRUE, BFR.SIZE=1e+07, ...)  
## Default S3 method:
isCompressedFile(filename, method=c("extension", "content"), ext, fileClass, ...)
## Default S3 method:
bzip2(filename, ..., ext="bz2", FUN=bzfile)
## Default S3 method:
bunzip2(filename, ..., ext="bz2", FUN=bzfile)
## Default S3 method:
gzip(filename, ..., ext="gz", FUN=gzfile)
## Default S3 method:
gunzip(filename, ..., ext="gz", FUN=gzfile)
```

Arguments

- **filename**: Pathname of input file.
- **destname**: Pathname of output file.
- **temporary**: If TRUE, the output file is created in a temporary directory.
- **skip**: If TRUE and the output file already exists, the output file is returned as is.
- **overwrite**: If TRUE and the output file already exists, the file is silently overwritten, otherwise an exception is thrown (unless skip is TRUE).
- **remove**: If TRUE, the input file is removed afterward, otherwise not.
- **BFR.SIZE**: The number of bytes read in each chunk.
- **method**: A character string specifying how to infer whether a file is compressed or not.
- **ext, fileClass, FUN** (internal) Filename extension, file class, and a connection function used to read from/write to file.

Details

Internally bzfile() and gzfile() (see connections) are used to read (write) files. If the process is interrupted before completed, the partially written output file is automatically removed.

Value

Returns the pathname of the output file. The number of bytes processed is returned as an attribute. isCompressedFile(), isGzipped() and isBzipped() return a logical. Note that with method = "extension" (default), only the filename extension is used to infer whether the file is compressed or not. Specifically, it does not matter whether the file actually exists or not.
Author(s)

Henrik Bengtsson

Examples

```r
## bzip2
cat(file="foo.txt", "Hello world!")
print(isBzipped("foo.txt"))
print(isBzipped("foo.txt.bz2"))

bzip2("foo.txt")
print(file.info("foo.txt.bz2"))
print(isBzipped("foo.txt"))
print(isBzipped("foo.txt.bz2"))

bunzip2("foo.txt.bz2")
print(file.info("foo.txt"))

## gzip
cat(file="foo.txt", "Hello world!")
print(isGzipped("foo.txt"))
print(isGzipped("foo.txt.gz"))

gzip("foo.txt")
print(file.info("foo.txt.gz"))
print(isGzipped("foo.txt"))
print(isGzipped("foo.txt.gz"))

gunzip("foo.txt.gz")
print(file.info("foo.txt"))

## Cleanup
file.remove("foo.txt")
```

compressPDF *Compresses a PDF (into a new PDF)*

Description

Compresses a PDF (into a new PDF).

Usage

```r
## Default S3 method:
compressPDF(filename, path=NULL, outFilename=basename(pathname),
    outPath="compressedPDFs", skip=FALSE, overwrite=FALSE, compression="gs(ebook)+qpdf",
    ...)
```
copyDirectory

Arguments

filename, path  The filename and (optional) path of the PDF to be compressed.
outFilename, outPath  The generated PDF.
skip  If TRUE and an existing output file, then it is returned.
overwrite  If FALSE, an error is thrown if the output file already exists, otherwise not.
compression  A character vector of compression methods to apply. This overrides any low-level arguments passed via ... that compactPDF.
...  Additional arguments passed to compactPDF, e.g. gs_quality.

Value

Returns the pathname of the generated PDF.

Author(s)

Henrik Bengtsson

See Also

Internally compactPDF is utilized.

Examples

```r
## Not run:
pathnameZ <- compressPDF("report.pdf")

## End(Not run)
```

Description

Copies a directory.

Usage

```r
## Default S3 method:
copyDirectory(from, to=".", ..., private=TRUE, recursive=TRUE)
```
countLines

Arguments

from      The pathname of the source directory to be copied.
to       The pathname of the destination directory.
...     Additional arguments passed to file.copy(), e.g. overwrite.
private If TRUE, files (and directories) starting with a period is also copied, otherwise not.
recursive If TRUE, subdirectories are copied too, otherwise not.

Details

Note that this method does not use copyFile() to copy the files, but file.copy().

Value

Returns (invisibly) a character vector of pathnames copied.

Author(s)

Henrik Bengtsson

countLines  Counts the number of lines in a text file

Description

Counts the number of lines in a text file by counting the number of occurrences of platform-independent newlines (CR, LF, and CR+LF [1]), including a last line with neither. An empty file has zero lines.

Usage

## Default S3 method:
countLines(file, chunkSize=5e+07, ...)

Arguments

file       A connection or a pathname.
chunkSize   The number of bytes read in each chunk.
...     Not used.

Details

Both compressed and non-compressed files are supported.
createFileAtomically

Value

Returns an non-negative integer.

Author(s)

Henrik Bengtsson

References


Examples

pathname <- system.file("NEWS", package="R.utils");
n <- countLines(pathname);
n2 <- length(readLines(pathname));
stopifnot(n == n2);

createFileAtomically  Creates a file atomically

Description

Creates a file atomically by first creating and writing to a temporary file which is then renamed.

Usage

## Default S3 method:
createFileAtomically(filename, path=NULL, FUN, ..., skip=FALSE, overwrite=FALSE, 
backup=TRUE, verbose=FALSE)

Arguments

filename  The filename of the file to create.
path  The path to the file.
FUN  A function that creates and writes to the pathname that is passed as the first argument. This pathname is guaranteed to be a non-existing temporary pathname.
...  Additional arguments passed to pushTemporaryFile() and popTemporaryFile().
skip  If TRUE and a file with the same pathname already exists, nothing is done/written.
overwrite  If TRUE and a file with the same pathname already exists, the existing file is overwritten. This is also done atomically such that if the new file was not successfully created, the already original file is restored. If restoration also failed, the original file remains as the pathname with suffix ".bak" appended.
backup  If TRUE and a file with the same pathname already exists, then it is backed up while creating the new file. If the new file was not successfully created, the original file is restored from the backup copy.
verbose  A logical or Verbose.
Value
Returns (invisibly) the pathname.

Author(s)
Henrik Bengtsson

See Also
Internally, pushTemporaryFile() and popTemporaryFile() are used for working toward a temporary file, and pushBackupFile() and popBackupFile() are used for backing up and restoring already existing file.

Examples

```r
# Create a file atomically
# -----------------------------------------------
\n\ncreateFileAtomically("foobar.txt", FUN=function(pathname) {
  cat(file=pathname, "This file was created atomically.\n")
  cat(file=pathname, "Timestamp: ", as.character(Sys.time()), "\n", sep="")
  for (kk in 1:n) {
    cat(file=pathname, kk, "\n", append=TRUE)
    # Emulate a slow process
    if (interactive()) Sys.sleep(0.1)
  }
  cat(file=pathname, "END OF FILE\n", append=TRUE)
}, overwrite=TRUE)

bfr <- readLines("foobar.txt")
cat(bfr, sep="\n")

# Overwrite the file atomically (emulate write failure)
# -----------------------------------------------
\n\ntryCatch({
  createFileAtomically("foobar.txt", FUN=function(pathname) {
    cat(file=pathname, "Trying to create a new file.\n")
    cat(file=pathname, "Writing a bit, but then an error...\n", append=TRUE)
    # Emulate write error
    stop("An error occurred while writing to the new file.")
  }, overwrite=TRUE)
}, error=function(ex) {
  print(ex$message)
})

# The original file was never overwritten
bfr2 <- readLines("foobar.txt")
```
createLink

```r
cat(bfr2, sep="\n")
stopifnot(identical(bfr2, bfr))

# The partially temporary file remains
stopifnot(isfile("foobar.txt.tmp"))
bfr3 <- readLines("foobar.txt.tmp")
cat(bfr3, sep="\n")

file.remove("foobar.txt.tmp")
```

---

**createLink**

*Creates a link to a file or a directory*

**Description**

Creates a link to a file or a directory. This method tries to create a link to a file/directory on the file system, e.g. a symbolic link and Windows Shortcut links. It depends on operating and file system (and argument settings), which type of link is finally created, but all this is hidden internally so that links can be created the same way regardless of system.

**Usage**

```r
## Default S3 method:
createlink(link=".", target, skip=!overwrite, overwrite=FALSE,
           methods=getOption("createlink/args/methods", c("unix-symlink", "windows-ntfs-symlink", "windows-shortcut")), ...)
```

**Arguments**

- **link**: The path or pathname of the link to be created. If "." (or **NULL**), it is inferred from the target argument, if possible.
- **target**: The target file or directory to which the shortcut should point to.
- **skip**: If **TRUE** and a file with the same name as argument **link** already exists, then the nothing is done.
- **overwrite**: If **TRUE**, an existing link file is overwritten, otherwise not.
- **methods**: A **character vector** specifying what methods (and in what order) should be tried for creating links.
- **...**: Not used.

**Value**

Returns (invisibly) the path or pathname to the link. If no link was created, **NULL** is returned.
Required privileges on Windows

In order for method="unix-symlink" (utilizing file.symlink()), method="windows-ntfs-symlink" (utilizing executable mklink), and/or method="windows-shortcut" (utilizing createWindowsShortcut()) to succeed on Windows, the client/R session must run with sufficient privileges (it has been reported that Administrative rights are necessary).

Author(s)

Henrik Bengtsson

References


See Also

createWindowsShortcut() and file.symlink()

createWindowsShortcut  Creates a Microsoft Windows Shortcut (.lnk file)

Description

Creates a Microsoft Windows Shortcut (.lnk file).

Usage

```r
## Default S3 method:
createWindowsShortcut(pathname, target, overwrite=FALSE, ...)
```

Arguments

- **pathname**: The pathname (with file extension *.lnk) of the link file to be created.
- **target**: The target file or directory to which the shortcut should point to.
- **overwrite**: If TRUE, an existing link file is overwritten, otherwise not.
- **...**: Not used.

Value

Returns (invisibly) the pathname.

Required privileges on Windows

In order for this method, which utilizes Windows Script Host a VBScript, to succeed on Windows, the client/R session must run with sufficient privileges (it has been reported that Administrative rights are necessary).
createWindowsShortcut

Author(s)

Henrik Bengtsson

References

[1] Create a windows shortcut (.LNK file), SS64.com, http://ss64.com/nt/shortcut.html

See Also

readWindowsShortcut()

Examples

# Create Windows Shortcut links to a directory and a file
targets <- list(
    system.file(package="R.utils"),
    system.file("DESCRIPTION", package="R.utils")
)

for (kk in seq_along(targets)) {
    cat("Link ", kk, "\n", sep="\n")

    target <- targets[[kk]]
    cat("Target: ", target, "\n", sep="\n")

    # Name of *.lnk file
    pathname <- sprintf("%s.LNK", tempfile())

    tryCatch({
        # Will only work on Windows systems with support for VB scripting
        createWindowsShortcut(pathname, target=target)
    }, error = function(ex) {
        print(ex)
    })

    # Was it created?
    if (isFile(pathname)) {
        cat("Created link file: ", pathname, "\n", sep="\n")
    }

    # Validate that it points to the correct target
    dest <- filePath(pathname, expandLinks="any")
    cat("Available target: ", dest, "\n", sep="\n")

    res <- all.equal(tolower(dest), tolower(target))
    if (!isTRUE(res)) {
        msg <- sprintf("Link target does not match expected target: %s != %s", dest, target)
        cat(msg, "\n")
        warning(msg)
    }

    # Cleanup
dataFrame

Allocates a data frame with given column classes

Description

Allocates a data frame with given column classes.

Usage

## Default S3 method:
dataFrame(colClasses, nrow=1, ...)

Arguments

- `colClasses`  A character vector of column classes, cf. read.table.
- `nrow` An integer specifying the number of rows of the allocated data frame.
- `...` Not used.

Value

Returns an NxK data.frame where N equals nrow and K equals length(colClasses).

See Also

data.frame.

Examples

df <- dataFrame(colClasses=c(a="integer", b="double"), nrow=10)
df[,1] <- sample(1:nrow(df))
df[,2] <- rnorm(nrow(df))
print(df)
detachPackage

Description

Detaches packages by name, if loaded.

Usage

```r
## Default S3 method:
detachPackage(pkgname, ...)
```

Arguments

- `pkgname`: A character vector of package names to be detached.
- `...`: Not used.

Value

Returns (invisibly) a named logical vector indicating whether each package was detached or not.

Author(s)

Henrik Bengtsson

See Also

- `detach()`.

---

dimNA

Sets the dimension of an object with the option to infer one dimension automatically. If one of the elements in the dimension vector is NA, then its value is inferred from the length of the object and the other elements in the dimension vector. If the inferred dimension is not an integer, an error is thrown.

Usage

```r
## Default S3 replacement method:
dimNA(x) <- value
```
**Arguments**

- **x** An R object.
- **value** `NULL` of a positive numeric vector with one optional NA.

**Value**

Returns (invisibly) what `dim<-()` returns (see `dim()` for more details).

**Author(s)**

Henrik Bengtsson

**See Also**

`dim()`.

**Examples**

```r
x <- 1:12
dimNA(x) <- c(2,NA,3)
stopifnot(dim(x) == as.integer(c(2,2,3)))
```

**Description**

Displays the contents of a text file with line numbers and more.

**Usage**

```r
## Default S3 method:
displayCode(con=NULL, code=NULL, numerate=TRUE, lines=-1, wrap=79, highlight=NULL, pager=getOption("pager"), ...)
```

**Arguments**

- **con** A connection or a character string filename. If code is specified, this argument is ignored.
- **code** A character vector of code lines to be displayed.
- **numerate** If TRUE, line are numbers, otherwise not.
- **lines** If a single numeric, the maximum number of lines to show. If -1, all lines are shown. If a vector of numeric, the lines numbers to display.
- **wrap** The (output) column numeric where to wrap lines.
- **highlight** A vector of line number to be highlighted.
doCall

Executes a function call with option to ignore unused arguments

Description

Executes a function call with option to ignore unused arguments.

Usage

```r
## Default S3 method:
doCall(.fcn, ..., args=NULL, alwaysArgs=NULL, .functions=list(.fcn),
   .ignoreUnusedArgs=TRUE, envir=parent.frame())
```
downloadFile.character

Downloads a file

Description

Downloads a file.

Usage

```r
# S3 method for class 'character'
downloadFile(url, filename=basename(url), path=NULL, skip=TRUE, overwrite=!skip, ...,
             username=NULL, password=NULL, binary=TRUE, dropEmpty=TRUE, verbose=FALSE)
```
Arguments

- **url**: A character string specifying the URL to be downloaded.
- **filename, path**: (optional) character strings specifying the local filename and the path of the downloaded file.
- **skip**: If TRUE, an already downloaded file is skipped.
- **overwrite**: If TRUE, an already downloaded file is overwritten, otherwise an error is thrown.
- **...**: Additional arguments passed to `download.file`.
- **username, password**: character strings specifying the username and password for authenticated downloads. The alternative is to specify these via the URL.
- **binary**: If TRUE, the file is downloaded exactly "as is", that is, byte by byte (recommended).
- **dropEmpty**: If TRUE and the downloaded file is empty, the file is ignored and NULL is returned.
- **verbose**: A logical, integer, or a Verbose object.

Details

Currently arguments username and password are only used for downloads via URL protocol 'https'. The 'https' protocol requires that either of 'curl' or 'wget' are available on the system.

Value

Returns the local pathname to the downloaded filename, or NULL if no file was downloaded.

Author(s)

Henrik Bengtsson

See Also

Internally `download.file` is used. That function may generate an empty file if the URL is not available.

Examples

```r
## Not run:
pathname <- downloadFile("http://www.r-project.org/index.html", path="www.r-project.org/")
print(pathname)

## End(Not run)
```
Description

Global substitute of expression using regular expressions.

Usage

egsub(pattern, replacement, x, ..., value=TRUE, envir=parent.frame(), inherits=TRUE)

Arguments

- pattern: A character string with the regular expression to be matched, cf. gsub().
- replacement: A character string of the replacement to use when there is a match, cf. gsub().
- x: The expression or a function to be modified.
- ...: Additional arguments passed to gsub()
- value: If TRUE, the value of the replacement itself is used to look up a variable with that name and then using that variables value as the replacement. Otherwise the replacement value is used.
- envir, inherits: An environment from where to find the variable and whether the search should also include enclosing frames, cf. get(). Only use if value is TRUE.

Value

Returns an expression.

Author(s)

Henrik Bengtsson

Examples

# Original expression
expr <- substitute(
  res <- foo.bar.yaa(2)
  print(res)
  R.utils::use("R.oo")
  x <- .b.
)

# Some predefined objects
foo.bar.yaa <- function(x) str(x)
a <- 2
b <- a
# Substitute with variable name
expr2 <- egsub("^[a-zA-Z0-9_.]+$", "\1", expr, value=FALSE)
print(expr2)
## {
##   res <- foo.bar.yaa(2)
##   print(res)
##   R.utils::use("R.oo")
##   x <- b
## }

# Substitute with variable value
expr3 <- egsub("^[a-zA-Z0-9_.]+$", "\1", expr, value=TRUE)
print(expr3)
## {
##   res <- foo.bar.yaa(2)
##   print(res)
##   R.utils::use("R.oo")
##   x <- 2
## }

# Substitute the body of a function
warnifnot <- egsub("stop", "warning", stopifnot, value=FALSE)
print(warnifnot)
warnifnot(pi == 3.14)

Env

Creates a new environment, evaluates an expression therein, and returns the environment.

Description

Creates a new environment, evaluates an expression therein, and returns the environment.

Usage

env(..., hash=FALSE, parent=parent.frame(), size=29L)

Arguments

Arguments passed to evalq(), particularly a expression to be evaluated inside the newly created environment.

hash, parent, size

Arguments passed to new.env().

Value

Returns an environment.

Author(s)

Henrik Bengtsson
References


See Also

Internally new.env() and evalq() are used.

Examples

```r
x <- list();

x$case1 <- env({
  # Cut'n'pasted from elsewhere
  a <- 1;
  b <- 2;
});

x$case2 <- env({
  # Cut'n'pasted from elsewhere
  foo <- function(x) x^2;
  a <- foo(2);
  b <- 1;
  rm(foo); # Not needed anymore
});

# Turn into a list of lists
x <- lapply(x, FUN=as.list);

str(x);
```

### extract.array

*Extract a subset of an array, matrix or a vector with unknown dimensions*

#### Description

Extract a subset of an array, matrix or a vector with unknown dimensions.

This method is useful when you do not know the number of dimensions of the object your wish to extract values from, cf. example.

#### Usage

```r
## S3 method for class 'array'
extract(x, ..., indices=list(...), dims=names(indices), drop=FALSE)
```
Arguments

- **x**: An array or a matrix.
- **indices**: A list of index vectors to be extracted.
- **dims**: An vector of dimensions - one per element in indices - which will be coerced to integers. If NULL, it will default to seq_along(indices).
- **drop**: If TRUE, dimensions of length one are dropped, otherwise not.

Value

Returns an array.

Author(s)

Henrik Bengtsson

See Also

slice.index()

Examples

```r
# Example using an array with a random number of dimensions
maxdim <- 4
dim <- sample(3:maxdim, size=sample(2:maxdim, size=1), replace=TRUE)
dim <- length(dim)
dimnames <- list()
for (kk in 1:ndim)
  dimnames[[kk]] <- sprintf("%s%d", letters[kk], 1:dim[kk])
x <- 1:prod(dim)
x <- array(x, dim=dim, dimnames=dimnames)

cat("\nArray 'x':\n")
print(x)


cat("\nExtract 'x[2:3,...]':\n")
print(extract(x, "1"="2:3"))

cat("\nExtract 'x[3,2:3,...]':\n")
print(extract(x, "1"="3","2"="2:3"))

cat("\nExtract 'x[,...,2:3]':\n")
print(extract(x, indices="2:3", dims=length(dim(x))))
```

# - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
fileAccess

Checks the permission of a file or a directory.

Usage

```r
## Default S3 method:
fileAccess(pathname, mode=0, safe=TRUE, ...)
```

Arguments

- `pathname`: A `character` string of the file or the directory to be checked.
- `mode`: An `integer` (0,1,2,4), cf. `file.access()`.
- `safe`: If `TRUE`, the permissions are tested more carefully, otherwise `file.access()` is used.
- `...`: Not used.

Details

In R there is `file.access()` for checking whether the permission of a file. Unfortunately, that function cannot be 100% trusted depending on platform used and file system queried, cf. [1].

Value

Returns an `integer`; 0 if the permission exists, -1 if not.

Symbolic links

This function follows symbolic links (also on Windows) and returns a value based on the link target (rather than the link itself).

Author(s)

Henrik Bengtsson
References


See Also

file.access()

Examples

# -----------------------------------------------
# Current directory
# -----------------------------------------------
path <- "."

# Test for existence
print(fileAccess(path, mode=0))
# Test for execute permission
print(fileAccess(path, mode=1))
# Test for write permission
print(fileAccess(path, mode=2))
# Test for read permission
print(fileAccess(path, mode=4))

# -----------------------------------------------
# A temporary file
# -----------------------------------------------
pathname <- tempfile()
cat(file=pathname, "Hello world!"

# Test for existence
print(fileAccess(pathname, mode=0))
# Test for execute permission
print(fileAccess(pathname, mode=1))
# Test for write permission
print(fileAccess(pathname, mode=2))
# Test for read permission
print(fileAccess(pathname, mode=4))

file.remove(pathname)

# -----------------------------------------------
# The 'base' package directory
# -----------------------------------------------
path <- system.file(package="base")

# Test for existence
print(fileAccess(path, mode=0))
# Test for execute permission
print(fileAccess(path, mode=1))
# Test for write permission
print(fileAccess(path, mode=2))
# Test for read permission
print(fileAccess(path, mode=4))

# The 'base' package DESCRIPTION file
# -----------------------------------------
pathname <- system.file("DESCRIPTION", package="base")

# Test for existence
print(fileAccess(pathname, mode=0))
# Test for execute permission
print(fileAccess(pathname, mode=1))
# Test for write permission
print(fileAccess(pathname, mode=2))
# Test for read permission
print(fileAccess(pathname, mode=4))

---

**filePath**

*Construct the path to a file from components and expands Windows Shortcuts along the pathname from root to leaf*

---

**Description**

Construct the path to a file from components and expands Windows Shortcuts along the pathname from root to leaf. This function is backward compatible with `file.path()` when argument `removeUps=FALSE` and `expandLinks="none"`, except that a (character) NA is return if any argument is NA.

This function exists on all platforms, not only Windows systems.

**Usage**

```r
## Default S3 method:
filePath(..., fsep=Platform$file.sep, removeUps=TRUE,
         expandLinks=c("none", "any", "local", "relative", "network"), unmap=FALSE,
         mustExist=FALSE, verbose=FALSE)
```

**Arguments**

- `...` Arguments to be pasted together to a file path and then be parsed from the root to the leaf where Windows shortcut files are recognized and expanded according to argument which in each step.
- `fsep` the path separator to use.
removeUps
If TRUE, relative paths, for instance "foo/bar/../" are shortened into "foo/", but also "./" are removed from the final pathname, if possible.

expandLinks
A character string. If "none", Windows Shortcut files are ignored. If "local", the absolute target on the local file system is used. If "relative", the relative target is used. If "network", the network target is used. If "any", first the local, then the relative and finally the network target is searched for.

unmap
If TRUE, paths on mapped Windows drives are "followed" and translated to their corresponding "true" paths.

mustExist
If TRUE and if the target does not exist, the original pathname, that is, argument pathname is returned. In all other cases the target is returned.

verbose
If TRUE, extra information is written while reading.

Details
If expandLinks != "none", each component, call it parent, in the absolute path is processed from the left to the right as follows: 1. If a "real" directory of name parent exists, it is followed. 2. Otherwise, if Microsoft Windows Shortcut file with name parent.lnk exists, it is read. If its local target exists, that is followed, otherwise its network target is followed. 3. If no valid existing directory was found in (1) or (2), the expanded this far followed by the rest of the pathname is returned quietly. 4. If all of the absolute path was expanded successfully the expanded absolute path is returned.

Value
Returns a character string.

On speed
Internal file.exists() is call while expanding the pathname. This is used to check if there exists a Windows shortcut file named 'foo.lnk' in 'path/foo/bar'. If it does, 'foo.lnk' has to be followed, and in other cases 'foo' is ordinary directory. The file.exists() is unfortunately a bit slow, which is why this function appears slow if called many times.

Author(s)
Henrik Bengtsson

See Also
readWindowsShellLink(). readWindowsShortcut(). file.path().

Examples

# Default
print(file.path("foo", "bar", ".", "name")) # "foo/bar/../name"

# Shorten pathname, if possible
print(filePath("foo", "bar", ".", "name")) # "foo/name"
print(filePath("foo/bar/../name")) # "foo/name"
# Recognize Windows Shortcut files along the path, cf. Unix soft links
filename <- system.file("data-ex/HISTORY.LNK", package="R.utils")
print(filename)
filename <- filePath(filename, expandLinks="relative")
print(filename)

FileProgressBar

A progress bar that sets the size of a file accordingly

Description

Package: R.utils

Class FileProgressBar

Object

~ | ~
~-----ProgressBar
~~~~~ | 
~~~~~~~~~FileProgressBar

Directly known subclasses:

public static class FileProgressBar
extends ProgressBar

Usage

FileProgressBar(pathname=NULL, ...)

Arguments

pathname The pathname of the output file.
...

Other arguments accepted by the ProgressBar constructor.

Details

A progress bar that sets the size of a file accordingly. This class useful to check the progress of a batch job by just querying the size of a file, for instance, via ftp.

Fields and Methods

Methods:
finalizeSession

```
cleanup  Removes the progress file for a file progress bar.
update   Updates file progress bar.
```

Methods inherited from ProgressBar:

- as.character, getBarString, increase, isDone, reset, setMaxValue, setProgress, setStepLength, setTicks, setValue, update

Methods inherited from Object:

- $, $<-, [], [[]<-., as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstanceInitializationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)

Henrik Bengtsson

Examples

```
## Not run:

# Creates a progress bar (of length 100) that displays itself as a file.
pb <- FileProgressBar("~/.progress.simulation")
reset(pb)
while (!isDone(pb)) {
  x <- rnorm(3e4)
  increase(pb)
  # Emulate a slow process
  if (interactive()) Sys.sleep(0.1)
  Sys.sleep(0.01)
}

## End(Not run)
```

**finalizeSession**  
*Function to call for finalizing the R session*

**Description**

Function to call for finalizing the R session. When called, all registered "onSessionExit" hooks (functions) are called. To define such hooks, use the `onSessionExit()` function.

This method should not be used by the user.

**Usage**

```
## Default S3 method:
finalizeSession(...)```
findSourceTraceback

Arguments

... Not used.

Value

Returns (invisibly) the hooks successfully called.

Author(s)

Henrik Bengtsson

See Also

See also sourceutils.

findSourceTraceback Finds all 'srcfile' objects generated by source() in all call frames

Description

Finds all 'srcfile' objects generated by source() in all call frames. This makes it possible to find out which files are currently scripted by source().

Usage

## Default S3 method:
findSourceTraceback(...) 

Arguments

... Not used.

Value

Returns a named list of srcfile() objects and/or character strings. The names of the list entries corresponds to the 'filename' value of each corresponding 'srcfile' object. The returned list is empty if source() was not called.

Author(s)

Henrik Bengtsson

See Also

See also sourceutils.
**Examples**

```r
# Create two R script files where one source()'s the other
# and both lists the traceback of filenames source()'d.
path <- tempdir();
pathnameA <- Arguments$WritablePathname("foo.R", path=path);
pathnameB <- Arguments$WritablePathname("bar.R", path=path);

code <- 'cat("BEGIN foo.R\n");
code <- c(code, 'print(findSourceTraceback());
); code <- c(code, sprintf('source("%s");', pathnameB));
code <- c(code, 'cat("END foo.R\n")');
code <- paste(code, collapse="\n");
cat(file=pathnameA, code);

code <- 'cat("BEGIN bar.R\n");
code <- c(code, 'x <- findSourceTraceback();
); code <- c(code, 'print(x);
); code <- c(code, 'cat("END bar.R\n")');
code <- paste(code, collapse="\n");
cat(file=pathnameB, code);

# Source the first file
source(pathnameA, echo=TRUE);
```

---

gcat  
*Parses, evaluates and outputs a GString*

**Description**

Parses, evaluates and outputs a GString.

**Usage**

```r
## Default S3 method:
gcat(..., file="", append=FALSE, envir=parent.frame())
```

**Arguments**

- `...` character strings passed to `gstring()`.
- `file` A connection, or a pathname where to direct the output. If "", the output is sent to the standard output.
- `append` Only applied if file specifies a pathname If TRUE, then the output is appended to the file, otherwise the files content is overwritten.
- `envir` The environment in which the GString is evaluated.
gcDLLs

Identifies and removes DLLs of packages already unloaded

Description
Identifies and removes DLLs of packages already unloaded. When packages are unloaded, they are ideally also unloading any DLLs (also known as a dynamic shared object or library) they have loaded. Unfortunately, not all package do this resulting in "stray" DLLs still being loaded and occupying R's limited registry. These functions identifies and removes such DLLs.

Usage

gcDLLs(gc=TRUE, quiet=TRUE)

Arguments

gc If TRUE, if there are stray DLLs, then the garbage collector is run before unloading those DLLs. This is done in order to trigger any finalizers, of which some may need those DLLs, to be called.

quiet If FALSE, a message is outputted for every stray DLL that is unloaded.

Details
If a library fails to unload, an informative warning is generated.

Value
Returns (invisibly) the set of stray DLLs identified.
How to unload DLLs in package (for package developers)

To unload a package DLL whenever the package is unloaded, add the following to your package:

```r
.onUnload <- function(libpath) {
  ## (1) Force finalizers to be called before removing the DLL
  ## in case some of them need the DLL.
  gc()

  ## (2) Unload the DLL for this package
  library.dynam.unload(.packageName, libpath)
}
```

Author(s)

Henrik Bengtsson

See Also

`getLoadedDLLs()`.

---

### `getAbsolutePath`

#### Gets the absolute pathname string

**Description**

Gets the absolute pathname string.

**Usage**

```r
## Default S3 method:
getAbsolutePath(pathname, workDirectory=getwd(), expandTilde=FALSE, ...)
```

**Arguments**

- `pathname` A character string of the pathname to be converted into an absolute pathname.
- `workDirectory` A character string of the current working directory.
- `expandTilde` If TRUE, tilde (~) is expanded to the corresponding directory, otherwise not.
- `...` Not used.

**Details**

This method will replace replicated slashes ("/"), with a single one, except for the double forward slashes prefixing a Microsoft Windows UNC (Universal Naming Convention) pathname.
Value

Returns a character string of the absolute pathname.

Author(s)

Henrik Bengtsson

See Also

isAbsolutePath().

---

### `getParent`

**Gets the string of the parent specified by this pathname**

**Description**

Gets the string of the parent specified by this pathname. This is basically, by default the string before the last path separator of the absolute pathname.

**Usage**

```r
## Default S3 method:
getParent(pathname, depth=1L, fsep=.Platform$file.sep, ...)
```

**Arguments**

- `pathname` A character string of the pathname to be checked.
- `depth` An integer specifying how many generations up the path should go.
- `fsep` A character string of the file separator.
- `...` Not used.

**Value**

Returns a character string if the parent exists, otherwise `NULL`.

**Author(s)**

Henrik Bengtsson
getRelativePath

**getRelativePath**  
*Gets the relative pathname relative to a directory*

---

**Description**

Gets the relative pathname relative to a directory.

**Usage**

```r
## Default S3 method:
getRelativePath(pathname, relativeTo=getwd(), caseSensitive=NULL, ...)
```

**Arguments**

- `pathname`  
  A character string of the pathname to be converted into an relative pathname.
- `relativeTo`  
  A character string of the reference pathname.
- `caseSensitive`  
  If TRUE, the comparison is case sensitive, otherwise not. If NULL, it is decided from the relative path.
- `...`  
  Not used.

**Details**

In case the two paths are on different file systems, for instance, C:/foo/bar/ and D:/foo/, the method returns `pathname` as is.

**Value**

Returns a character string of the relative pathname.

**Non-case sensitive comparison**

If `caseSensitive == NULL`, the relative path is used to decide if the comparison should be done in a case-sensitive mode or not. The current check is if it is a Windows path or not, that is, if the relative path starts with a device letter, then the comparison is non-case sensitive.

**Author(s)**

Henrik Bengtsson

**See Also**

- `getAbsolutePath()`, `isAbsolutePath()`
Examples

getRelativePath("foo", "foo")  # "."
getRelativePath("foo/bar", "foo")  # "bar"
getRelativePath("foo/bar", "foo/bar/yah")  # "."
getRelativePath("foo/bar/cool", "foo/bar/yah/sub")  # "../../cool"
getRelativePath("/tmp/bar/", "/bar/foo/")  # "././.tmp/bar"

# Windows
getRelativePath("C:/foo/bar/", "C:/bar/")  # "./foo/bar"
getRelativePath("C:/foo/bar/", "D:/bar/")  # "C:/foo/bar"

GString  
Character string with advanced substitutions

Description

Package: R.utils

Class GString

character

Directly known subclasses:

public static class GString
extends character

Usage

GString(..., sep="")

Arguments

... one or more objects, to be coerced to character vectors.
sep A character string to separate the terms.

Fields and Methods

Methods:

as.character Gets the processed character string.
evaluate Parses and evaluates a GString.
gcat -
Methods inherited from character:
Ops, nonStructure, vector-method, Ops, structure, vector-method, Ops, vector, nonStructure-method, Ops, vector, structure-method, all.equal, as.Date, as.POSIXlt, as.data.frame, as.raster, coerce, ANY, character-method, coerce, character, SuperClassMethod-method, coerce, character, signature-method, coerce<-, ObjectsWithPackage, character-method, coerce<-, signature, character-method, downloadFile, formula, getDLLRegisteredRoutines, isOpen, toAsciiRegExprPattern, toFileListTree, uses

Author(s)
Henrik Bengtsson

See Also
For convenience, see functions gstring() and gcat().

Examples
```r
# - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - # First example
# - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
who <- "world"

# Compare this...
cat(as.character(GString("Hello ${who}\n")))

# ...to this.
cat(GString("Hello ${who}\n"))

# Escaping
\n\n\n\n\n```
# Predefined "builtin" variables

```
x <- 1:5
y <- c("hello", "world")
cat(as.character(GString("(x,y)=$(x),(y)")), sep=" ", )
cat("\n")
```

```
cat(as.character(GString("(x,y)=$(x),[capitalize](y))"), sep=" ", )
cat("\n")
```

# Other built-in variables/functions...

```
cat(as.character(GString("Hello ${username} on host ${hostname} running ", "R v${rversion} in process ${pid} on ${os}. R is installed in ${rhome}.")))
```

# Evaluating inline R code

```
cat(as.character(GString("Simple calculation: 1+1=${'1+1'}\n")))
cat(as.character(GString("Alternative current date: ${'date'}\n")))
```

# Function values

```
# Call function rnorm with arguments n=1, i.e. rnorm(n=1)
cat(as.character(GString("Random normal number: ${n=1}[rnorm]\n")))
```

# Global search-replace feature

```
# Replace all '-' with '.'
cat(as.character(GString("Current date: ${date/-/}\n")))
```

# Defining new "builtin" function values

```
setMethodS3("getBuiltinALetter", "GString", function(object, ...) {
  base::letters[runif(1, min=1, max=length(base::letters))]
})
```
gstring

Parses and evaluates a GString into a regular string

Description
Parses and evaluates a GString into a regular string.

Usage
```r
## Default S3 method:
gstring(..., file=NULL, path=NULL, envir=parent.frame())
```

Arguments

- `...` character strings.
- `file`, `path` Alternatively, a file, a URL or a connection from which the strings are read. If a file, the path is prepended to the file, iff given.
- `envir` The environment in which the `GString` is evaluated.
hasUrlProtocol

Checks if one or several pathnames has a URL protocol.

Description

Checks if one or several pathnames has a URL protocol.

Usage

```r
## Default S3 method:
hasUrlProtocol(pathname, ...)
```

Arguments

- `pathname`: A character vector.
- `...`: Not used.

Value

Returns a logical vector.

Author(s)

Henrik Bengtsson
**hpaste**

*Concatenating vectors into human-readable strings*

Description

Concatenating vectors into human-readable strings such as "1, 2, 3, ..., 10".

Usage

```
## Default S3 method:
hpaste(..., sep="", collapse="", lastCollapse=NULL,  
  maxHead=if (missing(lastCollapse)) 3 else Inf,  
  maxTail=if (is.finite(maxHead)) 1 else Inf, abbreviate="...")
```

Arguments

... Arguments to be pasted.

sep A character string used to concatenate the arguments in ..., if more than one.

collapse, lastCollapse

The character strings to collapse the elements together, where lastCollapse is specifying the collapse string used between the last two elements. If lastCollapse is NULL (default), it is corresponds to using the default collapse.

maxHead, maxTail, abbreviate

Non-negative integers (also Inf) specifying the maximum number of elements of the beginning and then end of the vector to be outputted. If \( n = \text{length}(x) \) is greater than \( \text{maxHead} + \text{maxTail} + 1 \), then \( x \) is truncated to consist of \( x[1: \text{maxHead}] \), abbreviate, and \( x[(n-\text{maxTail} + 1):n] \).

Details

\( \text{hpaste}(..., \text{sep}=" ", \text{maxHead}=\text{Inf}) \) corresponds to \( \text{paste}(..., \text{sep}=" ", \text{collapse}=" ", \text{lastCollapse}=\text{NULL}) \).

Value

Returns a character string.

Author(s)

Henrik Bengtsson

See Also

Internally \text{paste}() is used.
Examples

# Some vectors
x <- 1:6
y <- 10:1
z <- LETTERS[x]

# Abbreviation of output vector
printf("x = %s\n", hpaste(x))
## x = 1, 2, 3, ..., 6.

printf("x = %s\n", hpaste(x, maxHead=2))
## x = 1, 2, ..., 6.

printf("x = %s\n", hpaste(x, maxHead=3)) # Default
## x = 1, 2, 3, ..., 6.

# It will never output 1, 2, 3, 4, ..., 6
printf("x = %s\n", hpaste(x, maxHead=4))
## x = 1, 2, 3, 4, 5, 6.

# Showing the tail
printf("x = %s\n", hpaste(x, maxHead=1, maxTail=2))
## x = 1, ..., 5, 6.

# Turning off abbreviation
printf("y = %s\n", hpaste(y, maxHead=Inf))
## y = 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

## or simply
printf("y = %s\n", paste(y, collapse="", "))
## y = 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

# Adding a special separator before the last element
# Change last separator
printf("x = %s\n", hpaste(x, lastCollapse="", and "))
## x = 1, 2, 3, 4, 5, and 6.

# Backward compatibility with paste()
s1 <- hpaste(x, maxHead=Inf)
s2 <- paste(x, collapse="", ")
printf("s = %s\n", s1);
stopifnot(identical(s1, s2))
inAnyInterval.numeric  Checks if a set of values are inside one or more intervals

Description

Checks if a set of values are inside one or more intervals.

Usage

## S3 method for class 'numeric'
inAnyInterval(...) 

Arguments

...  Arguments passed to mapToIntervals().

Value

Returns a logical vector.

Author(s)

Henrik Bengtsson

See Also

mapToIntervals()
**insert**

*Insert values to a vector at certain positions*

**Description**

Insert values to a vector at certain positions.

**Usage**

```r
## Default S3 method:
insert(x, ats, values = NA, useNames = TRUE, ...)
```

**Arguments**

- `x` The vector of data values.
- `ats` The indices of `x` where the values should be inserted.
- `values` A list or a vector of the values to be inserted. Should be of same length as `ats`, unless if a single value when it is automatically extended without a warning.
- `useNames` If FALSE, the names attribute is dropped/ignored, otherwise not. Only applied if argument `x` is named.
- `...` Not used.

**Author(s)**

Henrik Bengtsson

**See Also**

`append()` takes argument `after` (a scalar). For example, `append(x, y, after=after) == insert(x, values=y, ats=after)`. Contrary to `append()`, `insert()` accepts a vector of insert indices.

**Examples**

```r
# Insert NAs (default) between all values
y <- c(a=1, b=2, c=3)
print(y)
x <- insert(y, ats=2:length(y))
Ex <- c(y[1], NA_real_, y[2], NA_real_, y[3])
print(x)
stopifnot(identical(x,Ex))

# Insert at first position
y <- c(a=1, b=2, c=3)
print(y)
x <- insert(y, ats=1, values=rep(NA_real_,2))
Ex <- c(NA_real_,NA_real_,y)
print(x)
```
installPackages

Install R packages by name or URL

Description

Install R packages by name or URL.
installPackages

Usage

```r
## Default S3 method:
installPackages(pkgs, types="auto", repos=getOption("repos"), ..., destPath=".",
cleanup=TRUE)
```

Arguments

- **pkgs**: A character vector specifying the names and/or the URLs of the R packages to be installed.
- **types**: A character vector of corresponding package types.
- **repos**: A character vector of package repository URLs.
- **...**: Additional arguments passed to `install.packages`.
- **destPath**: Path where any downloaded files are saved.
- **cleanup**: If TRUE, downloaded and successfully installed package files are removed, otherwise not.

Value

Returns nothing.

Limitations

This method cannot install any packages that are already in use. Certain packages are always in use when calling this method, e.g. `R.methodsS3`, `R.oo`, and `R.utils`.

Author(s)

Henrik Bengtsson

Examples

```r
## Not run:
installPackages("R.rsp")
installPackages("http://cran.r-project.org/src/contrib/Archive/R.rsp/R.rsp_0.8.2.tar.gz")
installPackages("http://cran.r-project.org/bin/windows/contrib/r-release/R.rsp_0.9.17.zip")

## End(Not run)
```
intervalsToSeq.matrix  Generates a vector of indices from a matrix of intervals

Description
Generates a vector of indices from a matrix of intervals.

Usage
```r
# S3 method for class 'matrix'
intervalsToSeq(fromTo, sort=FALSE, unique=FALSE, ...)
```

Arguments
- `fromTo` An Nx2 integer matrix.
- `sort` If `TRUE`, the returned indices are ordered.
- `unique` If `TRUE`, the returned indices are unique.
- `...` Not used.

Author(s)
Henrik Bengtsson

See Also
`seqToIntervals()`.

Examples
```r
# Not run: See example(seqToIntervals)
```

intToBin  Converts an integer to a binary/octal/hexadecimal number

Description
Converts an integer to a binary/octal/hexadecimal number.

Usage
```r
intToBin(x)
intToOct(x)
intToHex(x)
```
Arguments

x  A numeric vector of integers to be converted.

Details

For length(x) > 1, the number of characters in each of returned elements is the same and driven by the x element that requires the highest number of character - all other elements are padded with zeros (or ones for negative values). This is why we for instance get intToHex(15) == "f" but intToHex(15:16) == c("0f", "10").

The supported range for intToHex(), intToOct(), and intToBin() is that of R integers, i.e. [-Machine$integer.max, +Machine$integer.max] where .Machine$integer.max is \(2^{31} - 1\). This limitation is there such that negative values can be converted too.

Value

Returns a character string of length length(x). For coercions out of range, NA_character_ is returned for such elements.

Author(s)

Henrik Bengtsson

isAbsolutePath

Checks if this pathname is absolute

Description

Checks if this pathname is absolute.

Usage

```r
## Default S3 method:
isAbsolutePath(pathname, ...)
```

Arguments

pathname  A character string of the pathname to be checked.

...  Not used.

Value

Returns a TRUE if the pathname is absolute, otherwise FALSE.

Author(s)

Henrik Bengtsson
isDirectory

Checks if the file specification is a directory

Description

Checks if the file specification is a directory.

Usage

```
## Default S3 method:
isDirectory(pathname, ...)
```

Arguments

- `pathname` - A `character` string of the pathname to be checked.
- `...` - Not used.

Value

Returns `TRUE` if the file specification is a directory, otherwise `FALSE` is returned.

Symbolic links

This function follows symbolic links (also on Windows) and returns a value based on the link target (rather than the link itself).

Author(s)

Henrik Bengtsson

See Also

To check if it is a file see `isFile()`. Internally `file.info()` is used. See also `file.test`.

isEof.connection

Checks if the current file position for a connection is at the 'End of File'

Description

Checks if the current file position for a connection is at the 'End of File'.

Usage

```
## S3 method for class 'connection'
isEof(con, ...)
```
isFile

Arguments

con

A connection.

... Not used.

Details

Internally seek() is used, which according to to the R help is discouraged on Windows. However, after many years of large-scale testing on various Windows versions and file systems we have yet to experience issues with using seek() on Windows.

Value

Returns a logical.

Author(s)

Henrik Bengtsson

See Also

For more information see connection.

<table>
<thead>
<tr>
<th>isFile</th>
<th>Checks if the file specification is a file</th>
</tr>
</thead>
</table>

Description

Checks if the file specification is a file.

Usage

```r
## Default S3 method:
isFile(pathname, ...)
```

Arguments

pathname A character string of the pathname to be checked.

... Not used.

Value

Returns TRUE if the file specification is a file, otherwise FALSE is returned.

Symbolic links

This function follows symbolic links (also on Windows) and returns a value based on the link target (rather than the link itself).
isopen.character

Author(s)
Henrik Bengtsson

See Also
To check if it is a directory see isDirectory(). Internally file.info() is used. See also file_test.

---

isopen.character  Checks if there is an open connection to a file

Description
Checks if there is an open connection to a file.

Usage
```r
## S3 method for class 'character'
isOpen(pathname, rw=c("read", "write"), ...)
```

Arguments

- `pathname` An character vector.
- `rw` A character vector. If "read", a file is considered to be open if there exist an open connection that can read from that file. If "write", a file is considered to be open if there exist an open connection that can write to that file. Both these values may be specified.
- `...` Not used.

Value
Returns a logical vector indicating for each file whether there exists an open file connection or not.

Author(s)
Henrik Bengtsson

See Also
See isOpen() in connections. showConnections().
isPackageInstalled  Checks if a package is installed or not

Description

Checks if a package is installed or not.

Usage

## Default S3 method:

isPackageInstalled(package, ...)

Arguments

- package  A character vector of package names.
- ...  Not used.

Value

Returns a logical vector.

Author(s)

Henrik Bengtsson

See Also

isPackageLoaded().

isPackageLoaded  Checks if a package is loaded or not

Description

Checks if a package is loaded or not. Note that, contrary to `require()`, this function does not load the package if not loaded.

Usage

## Default S3 method:

isPackageLoaded(package, version=NULL, ...)

Arguments

package    The name of the package.
version    A character string specifying the version to test for. If NULL, any version is
tested for.
...        Not used.

Value

Returns a logical.

Author(s)

Henrik Bengtsson

See Also

To check if a package is installed or not, see isPackageInstalled().

isReplicated Identifies all entries with replicated values

Description

Identifies all entries with replicated values, that is, with values that exist more than once.

Usage

isReplicated(x, ...)
replicates(x, ...)

Arguments

x    A vector of length K.
...   Additional arguments passed to duplicated().

Details

Let reps <- isReplicated(x). Then it always holds that:

• reps == rev(isReplicated(rev(x)))
• reps == duplicated(x) | duplicated(x, fromLast=TRUE)
• reps == !is.element(x, setdiff(x, unique(x[duplicated(x)])))

Value

A logical vector of length K, where TRUE indicates that the value exists elsewhere, otherwise not.
Author(s)

Henrik Bengtsson

See Also

Internally duplicated() is used. See also isSingle().

Examples

```r
x <- c(1,1,2,3,4,2,1)
x <- base::letters[x]
print(x)

# Identify entries with replicated values
reps <- isReplicated(x)
print(x[reps])
stopifnot(x[reps] == replicates(x))

# Identify entries with unique values
print(x[!reps])
stopifnot(x[!reps] == singles(x))

# Validation
# --------------------------------------------------
x <- c(1,1,2,3,4,2,1)
x <- base::letters[x]
reps <- isReplicated(x)
stopifnot(all(table(x[reps]) > 1))
stopifnot(all(table(x[!reps]) == 1))
stopifnot(all(reps == rev(isReplicated(rev(x)))))
stopifnot(all(reps == duplicated(x) | duplicated(x, fromLast=TRUE)))
stopifnot(all(reps == !is.element(x, setdiff(x, unique(x[duplicated(x)])))))
stopifnot(all(sort(c(singles(x), replicates(x))) == sort(x)))

# Benchmarking singles()
# --------------------------------------------------
set.seed(80xBEEF)
N <- 1e6
x <- sample(1:(N/2), size=N, replace=TRUE)
t <- system.time(
  s <- isSingle(x)
)
print(sum(s))
t0 <- system.time(
  s0 <- !(x %in% x[duplicated(x)]);
```
isSingle  

Identifies all entries that exists exactly once

**Description**

Identifies all entries that exists exactly once.

**Usage**

```r
isSingle(x, ...)
singles(x, ...)
```

**Arguments**

- `x`: A vector of length K.
- `...`: Additional arguments passed to `isReplicated()`.

**Value**

A logical vector of length K, indicating whether the value is unique or not.

**Author(s)**

Henrik Bengtsson

**See Also**

Internally `isReplicated()` is used.

isUrl  

Checks if one or several pathnames is URLs

**Description**

Checks if one or several pathnames is URLs.

**Usage**

```r
## Default S3 method:
isUrl(pathname, ...)
```
Arguments

pathname A character vector.

... Not used.

Value

Returns a logical vector of either TRUE or FALSE.

Author(s)

Henrik Bengtsson

---

```
isZero Checks if a value is (close to) zero or not
```

Description

Checks if a value (or a vector of values) is (close to) zero or not where "close" means if the absolute value is less than neps*eps. *Note that x == 0 will not work in all cases.*

By default eps is the smallest possible floating point value that can be represented by the running machine, i.e. .Machine$double.eps and neps is one. By changing neps it is easy to adjust how close to zero "close" means without having to know the machine precision (or remembering how to get it).

Usage

```r
## Default S3 method:
isZero(x, neps=1, eps=.Machine$double.eps, ...)
```

Arguments

- **x** A vector of values.
- **eps** The smallest possible floating point.
- **neps** A scale factor of eps specifying how close to zero "close" means. If eps is the smallest value such that 1 + eps != 1, i.e. .Machine$double.eps, neps must be greater or equal to one.
- ... Not used.

Value

Returns a logical vector indicating if the elements are zero or not.

Author(s)

Henrik Bengtsson
See Also

`all.equal()`, `Comparison`, `.Machine`.

Examples

```r
x <- 0
print(x == 0)  # TRUE
print(isZero(x))  # TRUE

x <- 1
print(x == 0)  # FALSE
print(isZero(x))  # FALSE

x <- .Machine$double.eps
print(x == 0)  # FALSE
print(isZero(x))  # FALSE

x <- 0.9 *.Machine$double.eps
print(x == 0)  # FALSE
print(isZero(x))  # TRUE

# From help(Comparisons)
x1 <- 0.5 - 0.3
x2 <- 0.3 - 0.1
print(x1 - x2)
print(x1 == x2)  # FALSE on most machines
print(identical(all.equal(x1, x2), TRUE))  # TRUE everywhere
print(isZero(x1 - x2))  # TRUE everywhere
```

---

Java

Static class for Java related methods

Description

Package: R.utils

Class Java

```
Object
```

```
~~|  
~~|--Java

Directly known subclasses:

```
public static class Java
extends Object
```
Static class that provides methods for reading and writing Java data types. Currently the following data types are supported: byte, short and int. R character strings can be written as UTF-8 formatted strings, which can be read by Java. Currently on Java String’s that contain ASCII characters can be imported into R. The reason for this is that other characters are translated into non-eight bits data, e.g. 16- and 24-bits, which the readChar() method currently does not support.

Furthermore, the Java class defines some static constants describing the minimum and maximum value of some of the common Java data types: BYTE_MIN, BYTE_MAX, SHORT_MIN, SHORT_MAX, INT_MIN, INT_MAX, LONG_MIN, and LONG_MAX.

Usage
Java()

Fields and Methods

Methods:

<table>
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<th>Method</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>asByte</td>
<td>Converts a numeric to a Java byte.</td>
</tr>
<tr>
<td>asInt</td>
<td>Converts an numeric to a Java integer.</td>
</tr>
<tr>
<td>asLong</td>
<td>Converts a numeric to a Java long.</td>
</tr>
<tr>
<td>asShort</td>
<td>Converts a numeric to a Java short.</td>
</tr>
<tr>
<td>readByte</td>
<td>Reads a Java formatted byte (8 bits) from a connection.</td>
</tr>
<tr>
<td>readInt</td>
<td>Reads a Java formatted int (32 bits) from a connection.</td>
</tr>
<tr>
<td>readShort</td>
<td>Reads a Java formatted short (16 bits) from a connection.</td>
</tr>
<tr>
<td>readUTF</td>
<td>Reads a Java (UTF-8) formatted string from a connection.</td>
</tr>
<tr>
<td>writeByte</td>
<td>Writes a byte (8 bits) to a connection in Java format.</td>
</tr>
<tr>
<td>writeInt</td>
<td>Writes a integer (32 bits) to a connection in Java format.</td>
</tr>
<tr>
<td>writeShort</td>
<td>Writes a short (16 bits) to a connection in Java format.</td>
</tr>
<tr>
<td>writeUTF</td>
<td>Writes a string to a connection in Java format (UTF-8).</td>
</tr>
</tbody>
</table>

Methods inherited from Object:
S, $<-, [], [[]<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)

Henrik Bengtsson

Examples

```r
pathname <- tempfile()

# Open the temporary file for writing
out <- file(pathname, open="wb")
b <- -128:127
```
Java$writeByte(out, b)
s <- -32768:32767
Java$writeShort(out, s)
i <- c(-2147483648, -2147483647, -1, 0, +1, 2147483646, 2147483647);
Java$writeInt(out, i)
str <- c("This R string was written (using the UTF-8 format) using",
"the static methods of the Java class in the R.io package."
)
str <- paste(str, collapse="\n")
Java$writeUTF(out, str)
close(out)

# Open the temporary file for reading
inn <- file(pathname, open="rb")

bfr <- Java$readByte(inn, n=length(b))
cat("Read ", length(bfr), " bytes.\n", sep="")
if (!identical(bfr, b))
  throw("Failed to read the same data that was written."
)

bfr <- Java$readShort(inn, n=length(s))
cat("Read ", length(bfr), " shorts.\n", sep="")
if (!identical(bfr, s))
  throw("Failed to read the same data that was written."
)

bfr <- Java$readInt(inn, n=length(i))
cat("Read ", length(bfr), " ints.\n", sep="")
if (!identical(bfr, i))
  throw("Failed to read the same data that was written."
)

bfr <- Java$readUTF(inn)
cat("Read ", nchar(bfr), " UTF characters:\n", "", bfr, "\n", sep="")
close(inn)
file.remove(pathname)

---

**lastModified**

*Gets the time when the file was last modified*

---

**Description**

Gets the time when the file was last modified. The time is returned as a POSIXct object.

**Usage**

```r
## Default S3 method:
lastModified(pathname, ...)
```
Arguments

pathname : A character string of the pathname to be checked.

Value

Returns POSIXct object specifying when the file was last modified. If the file does not exist or it is a directory, \( \emptyset \) is returned.

Symbolic links

This function follows symbolic links (also on Windows) and returns a value based on the link target (rather than the link itself).

Author(s)

Henrik Bengtsson

See Also

Internally `file.info()` is used.

---

**LComments**

*The LComments class*

---

Description

Package: R.utils

**Class LComments**

**Object**

```
| ~~~ |
| ~~~~---SmartComments 
| ~~~~| 
| ~~~~~~~~~---VComments 
| ~~~~~~~~~~| 
| ~~~~~~~~~~~~---LComments
```

Directly known subclasses:

public static class **LComments**
extends **VComments**

The LComments class.
This class is almost identical to the super class, except that the constructor has different defaults.
listDirectory

Usage

LComments(letter="l", verboseName="log", ...)

Arguments

- letter: The smart letter.
- verboseName: The name of the verbose object.
- ...: Not used.

Fields and Methods

- Methods:
  No methods defined.
- Methods inherited from VComments: convertComment, reset, validate
- Methods inherited from SmartComments: compile, convertComment, parse, reset, validate
- Methods inherited from Object: $, $<-, [], [[<-], as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)

Henrik Bengtsson

listDirectory

Gets the file names in the directory

Description

Gets the file names in the directory.

Contrary to list.files(), this method guarantees to work recursively. Moreover, when subdirectories are processed recursively, directory names are also returned.

Usage

## Default S3 method:
listDirectory(path=".", pattern=NULL, recursive=FALSE, allNames=FALSE, fullNames=FALSE, ...)

`listDirectory` is a function that gets the file names in the directory. It works recursively, unlike the `list.files()` function, and can return directory names as well.
loadObject

**Arguments**

- **path**
  A path to be listed.
- **pattern**
  A character string of the filename pattern passed. See `list.files()` for more details.
- **recursive**
  If `TRUE`, subdirectories are recursively processed, and not if `FALSE`. Alternatively, the maximum recursive depth can be specified as a non-negative numeric, where `FALSE` corresponds to 0 depth and `TRUE` corresponds `Inf` depth.
- **allNames**
  If `TRUE`, also files starting with a period are returned.
- **fullNames**
  If `TRUE`, the full path names are returned.
- ... Not used.

**Value**

Returns a vector of file names.

**Recursive searching**

Recursive searching of directory structure is done breadth-first in a lexicographic order.

**Author(s)**

Henrik Bengtsson

**See Also**

Internally `list.files()` is used.

---

**loadObject**  
*Method to load object from a file or a connection*

**Description**

Method to load object from a file or a connection, which previously have been saved using `saveObject()`.

**Usage**

```r
## Default S3 method:
loadObject(file, path=NULL, format=c("auto", "xdr", "rds"), ...)
```

**Arguments**

- **file**
  A filename or `connection` to read the object from.
- **path**
  The path where the file exists.
- **format**
  File format.
- ... Not used.
mapToIntervals.numeric

Details

The main difference from this method and load() in the base package, is that this one returns the object read rather than storing it in the global environment by its default name. This makes it possible to load objects back using any variable name.

Value

Returns the saved object.

Author(s)

Henrik Bengtsson

See Also

saveObject() to save an object to file. Internally load() is used. See also loadToEnv(). See also saveRDS().

mapTo_intervals numeric

Maps values to intervals

Description

Maps values to intervals by returning an index vector specifying the (first) interval that each value maps to, if any.

Usage

## S3 method for class 'numeric'
mapTo_intervals(x, intervals, includeLower=TRUE, includeUpper=TRUE, ...)

Arguments

- **x**: A numeric vector of K values to be matched.
- **intervals**: The N intervals to be matched against. If an Nx2 numeric matrix, the first column should be the lower bounds and the second column the upper bounds of each interval. If a numeric vector of length 2N, each consecutive pair should be the lower and upper bounds of an interval.
- **includeLower**, **includeUpper**: If TRUE, the lower (upper) bound of each interval is included in the test, otherwise not.
- **...**: Not used.

Value

Returns an integer vector of length K. Values that do not map to any interval have return value NA.
mergeIntervals.numeric

Merges intervals

Description

Merges intervals by returning an index vector specifying the (first) interval that each value maps to, if any.

Usage

```r
## S3 method for class 'numeric'
mergeIntervals(intervals, ...)
```

Arguments

- `intervals`: The N intervals to be merged. If an Nx2 numeric matrix, the first column should be the lower bounds and the second column the upper bounds of each interval. If a numeric vector of length 2N, each consecutive pair should be the lower and upper bounds of an interval.
- `...`: Not used.

Details

The upper and lower bounds are considered to be inclusive, that is, all intervals are interpreted to be of form \([a,b]\). There is currently no way to specify intervals with open bounds, e.g. \((a,b]\).

Furthermore, the bounds are currently treated as real values. For instance, merging \([0,1]\) and \([2,3]\) will return the same intervals. Note, if integer intervals were treated specially, we would merge these intervals to integer interval \([0,3] = \{0,1,2,3\}\).

Value

Returns a matrix (or a vector) of M intervals, where M <= N. The intervals are ordered by their lower bounds. The @mode of the returned intervals is the same as the mode of the input intervals.

Author(s)

Henrik Bengtsson
mkdirs

See Also

`inAnyInterval()`, `match()`.

---

### mkdirs

*Creates a directory including any necessary but nonexistent parent directories*

---

**Description**

Creates a directory including any necessary but nonexistent parent directories.

**Usage**

```r
## Default S3 method:
mkdirs(pathname, mustWork=FALSE, maxTries=5L, ...)
```

**Arguments**

- `pathname`: A character string of the pathname to be checked.
- `mustWork`: If `TRUE` and the directory does not already exists or is failed to be created, an error is thrown, otherwise not.
- `maxTries`: A positive integer specifying how many times the method should try to create a missing directory before giving up.
- `...`: Not used.

**Value**

Returns `TRUE` if the directory was successfully created, otherwise `FALSE`. Note that if the directory already exists, `FALSE` is returned.

**Slow file systems**

On very rare occasions, we have observed on a large shared file system that if one tests for the existence of a directory immediately after creating it with `dir.create()`, it may appear not to be created. We believe this is due to the fact that there is a short delay between creating a directory and that information being fully propagated on the file system. To minimize the risk for such false assertions on "slow" file systems, this method tries to create a missing directory multiple times (argument `maxTries`) (while waiting a short period of time between each round) before giving up.

**Author(s)**

Henrik Bengtsson

**See Also**

Internally `dir.create()` is used.
miscellaneous functions for outputting via message()

Description

Miscellaneous functions for outputting via message(). These "m*" methods work analogously to their corresponding "*" methods print(), cat(), show, str, and printf() but uses message() to output the content, which in turn outputs to standard error. The mout() method can be used for all other output methods, e.g. mout(write(x, file=stdout())).

Usage

mout(..., appendLF=FALSE)

Arguments

... Arguments passed to the underlying output method.
appendLF A logical specifying whether to append a newline at the end or not.

Value

Returns what the message() returns.

Author(s)

Henrik Bengtsson

Examples

print(letters[1:8])
mprint(letters[1:8])

cat(c(letters[1:8], "\n"))
mcat(c(letters[1:8], "\n"))

str(letters[1:8])
mstr(letters[1:8])

printf("x=%d\n", 1:3)
mprintf("x=%d\n", 1:3)
**mpager**

A "pager" function that outputs to standard error

**Description**

A "pager" function that outputs to standard error and is compatible with `file.show()`.

**Usage**

```r
mpager(files, header=NULL, title="R Information", delete.file=FALSE)
```

**Arguments**

- **files**: A character vector of pathnames.
- **header**: A character vector of headers.
- **title**: A character string.
- **delete.file**: If TRUE, the files are deleted after displayed, otherwise not.

**Value**

Returns nothing.

**Author(s)**

Henrik Bengtsson

**See Also**

`file.show()` and argument pager.

---

**nullfile**

*Gets the pathname or a connection to the NULL device on the current platform*

**Description**

Gets the pathname or a connection to the NULL device on the current platform.

**Usage**

```r
nullfile()
nullcon()
```
Value

`nullfile()` returns a `character` string, which is "/dev/null" except on Windows where it is "nul:.". `nullcon()` returns a newly opened (binary) `connection` to the NULL device - make sure to close it when no longer needed.

Author(s)

Henrik Bengtsson

See Also

In R (>= 3.6.0), there exists `base::nullfile()`, which is identical to `R.utils::nullfile()`.

---

### NullVerbose

**A Verbose class ignoring everything**

Description

Package: R.utils

Class `NullVerbose`

```
Object
| ~|~
| ~|---Verbose
| ~~~|~
| ~~~~~~~|---NullVerbose
```

Directly known subclasses:

```
public static class NullVerbose
extends Verbose
```

A Verbose class ignoring everything.

Usage

```
NullVerbose(...)  
```

Arguments

```
...  
Ignored.
```

Fields and Methods

Methods:
onGarbageCollect

```r
onGarbageCollect <- function() {
  # Function to be called when the R garbage collector is (detected to be) running
}
```

### Description

 Registers a function to be called when the R garbage collector is (detected to be) running.

### Methods inherited from `Verbose`

- as.character, as.double, as.logical, capture, cat, enter, enterf, equals, evaluate, exit, getThreshold, getTimestampFormat, header, isOn, isVisible, less, more, newline, off, on, popState, print, printf, pushState, ruler, setDefaultLevel, setThreshold, setTimestampFormat, str, summary, timestamp, timestampOff, timestampOn, warnings, writeRaw

### Methods inherited from `Object`

- $, $<-, $[, $[]<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

### Author(s)

Henrik Bengtsson

### Examples

```r
verbose <- Verbsoe()
cat(verbose, "A verbose messages")

verbose <- NullVerbsoe()
cat(verbose, "A verbose messages")  # Ignored
```
Usage

```r
## Default S3 method:
onGarbageCollect(fcn, action=c("prepend", "append", "replace"), ...)
```

Arguments

- **fcn**: A function to be called without argument.
- **action**: A character string specifying how the hook function is added to list of hooks.
- **...**: Not used.

Value

Returns (invisibly) the hooks successfully called.

Author(s)

Henrik Bengtsson

Examples

```r
## Not run:
onGarbageCollect(function(...) {
    message("The R garbage collector is running!"
  })
## End(Not run)
```

---

**onSessionExit**

Registers a function to be called when the R session finishes

Description

Registers a function to be called when the R session finishes.

Usage

```r
## Default S3 method:
onSessionExit(fcn, action=c("prepend", "append", "replace"), ...)
```

Arguments

- **fcn**: A function to be called without argument.
- **action**: A character string specifying how the hook function is added to list of hooks.
- **...**: Not used.
Details

Functions registered this way are called when `finalizeSession()` is called. Moreover, when this package is loaded, the `.Last()` function is modified such that `finalizeSession()` is called. However, note that `.Last()` is not guaranteed to be called when the R session finished. For instance, the user may quit R by calling `quit(callLast=FALSE)`. Moreover, when R is run in batch mode, `.Last()` is never called.

Value

Returns (invisibly) the hooks successfully called.

Author(s)

Henrik Bengtsson

See Also

`.Last()`. `finalizeSession()`.

Examples

```r
## Not run:
onSessionExit(function(...) {
    message("Bye bye world!")
})

quit()
## End(Not run)
```

Options

The Options class

Description

Package: R.utils

Class Options

```
Object
|--- Options
```

Directly known subclasses:

Settings
public static class Options
    extends Object

    A class to set and get either options stored in a list tree structure.
    Each option has a pathname. The format of a pathname is similar to a (Unix) filesystem pathname, e.g. "graphics/cex". See examples for more details.

Usage

    Options(options=list(), ...)

Arguments

    options         A tree list structure of options.
    ...             Not used.

Details

    Note, this class and its methods do not operate on the global options structure defined in R (options).

Value

    The constructor returns an Options object.

Fields and Methods

    Methods:

        as.character     Returns a character string version of this object.
        as.list          Gets a list representation of the options.
        equals          Checks if this object is equal to another Options object.
        getLeaves       Gets all (non-list) options in a flat list.
        getOption       Gets an option.
        hasOption       Checks if an option exists.
        names           Gets the full pathname of all (non-list) options.
        nbrOfOptions    Gets the number of options set.
        setOption       Sets an option.
        str              Prints the structure of the options.

Methods inherited from Object:

$<-, $<-, [.}, [[<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)

    Henrik Bengtsson
Examples

```r
local <- Options()

# Query a missing option
cex <- getOption(local, "graphics/cex")
cat("graphics/cex =", cex, "\n") # Returns NULL

# Query a missing option with default value
cex <- getOption(local, "graphics/cex", defaultValue=1)
cat("graphics/cex =", cex, "\n") # Returns NULL

# Set option and get previous value
oldCex <- setOption(local, "graphics/cex", 2)
cat("previous graphics/cex =", oldCex, "\n") # Returns NULL

# Set option again and get previous value
oldCex <- setOption(local, "graphics/cex", 3)
cat("previous graphics/cex =", oldCex, "\n") # Returns 2

# Query a missing option with default value, which is ignored
cex <- getOption(local, "graphics/cex", defaultValue=1)
cat("graphics/cex =", cex, "\n") # Returns 3

# Query multiple options with multiple default values
multi <- getOption(local, c("graphics/cex", "graphics/pch"), c(1,2))
print(multi);

# Check existence of multiple options
has <- hasOption(local, c("graphics/cex", "graphics/pch"))
print(has);

# Get a subtree of options
graphics <- getOption(local, "graphics")
print(graphics)

# Get the complete tree of options
all <- getOption(local)
print(all)
```

Description

Patches installed and loaded packages and more.
Usage

```r
## Default S3 method:
patchCode(paths=NULL, recursive=TRUE, suppressWarnings=TRUE,
knownExtensions=c("R", "r", "S", "s"), verbose=FALSE, ...)
```

Arguments

- **paths**
  The path to the directory (and subdirectories) which contains source code that will patch loaded packages. If `NULL`, the patch path is given by the option `R_PATCHES`. If the latter is not set, the system environment with the same name is used. If neither is given, then `~/.patches/` is used.

- **recursive**
  If `TRUE`, source code in subdirectories will also get loaded.

- **suppressWarnings**
  If `TRUE`, warnings will be suppressed, otherwise not.

- **knownExtensions**
  A character vector of filename extensions used to identify source code files. All other files are ignored.

- **verbose**
  If `TRUE`, extra information is printed while patching, otherwise not.

- **...**
  Not used.

Details

The method will look for source code files (recursively or not) that match known filename extensions. Each found source code file is then `source()`d.

If the search is recursive, subdirectories are entered if and only if either (1) the name of the subdirectory is the same as a loaded (and installed) package, or (2) if there is no installed package with that name. The latter allows common code to be organized in directories although it is still not assigned to packages.

Each of the directories given by argument `paths` will be processed one by one. This makes it possible to have more than one file tree containing patches.

To set an options, see `options()`. To set a system environment, see `Sys.setenv()`. The character `;` is interpreted as a separator. Due to incompatibility with Windows pathnames, `:` is not a valid separator.

Value

Returns (invisibly) the number of files sourced.

Author(s)

Henrik Bengtsson

See Also

`source()`, `library()`.
Examples

## Not run:

```r
# Patch all source code files in the current directory
patchCode(".")
```

```r
# Patch all source code files in R_PATCHES
options("R_PATCHES"="/R-patches/")
# alternatively, Sys.setenv("R_PATCHES"="/R-patches/")
patchCode()
```

## End(Not run)

---

**popBackupFile**

* Drops a backup suffix from the backup pathname *

---

**Description**

Drops a backup suffix from the backup pathname and, by default, restores an existing backup file accordingly by renaming it.

**Usage**

```r
## Default S3 method:
popBackupFile(filename, path=NULL, suffix=".bak", isFile=TRUE,
onMissing="ignore", "error"), drop=TRUE, ..., verbose=FALSE)
```

**Arguments**

- **filename** The filename of the backup file.
- **path** The path of the file.
- **suffix** The suffix of the filename to be dropped.
- **isFile** If `TRUE`, the backup file must exist and will be renamed. If `FALSE`, it is only the pathname string that will be modified. For details, see below.
- **onMissing** A character string specifying what to do if the backup file does not exist.
- **drop** If `TRUE`, the backup file will be dropped in case the original file already exists or was successfully restored.
- **...** Not used.
- **verbose** A logical or `Verbose`.

**Value**

Returns the pathname with the backup suffix dropped.

**Author(s)**

Henrik Bengtsson
popTemporaryFile

* Drops a temporary suffix from the temporary pathname

Description

Drops a temporary suffix from the temporary pathname and, by default, renames an existing temporary file accordingly.

Usage

```r
## Default S3 method:
popTemporaryFile(filename, path=NULL, suffix=".tmp", isFile=TRUE, ..., verbose=FALSE)
```

Arguments

- `filename`: The filename of the temporary file.
- `path`: The path of the temporary file.
- `suffix`: The suffix of the temporary filename to be dropped.
- `isFile`: If `TRUE`, the temporary file must exist and will be renamed. If `FALSE`, it is only the pathname string that will be modified. For details, see below.
- `...`: Not used.
- `verbose`: A logical or `Verbose`.

Details

If `isFile` is `FALSE`, the pathname where the suffix of the temporary pathname has been dropped is returned. If `isFile` is `TRUE`, the temporary file is renamed. Then, if the temporary file does not exist or it was not successfully renamed, an exception is thrown.

Value

Returns the pathname with the temporary suffix dropped.

Author(s)

Henrik Bengtsson

See Also

See `pushBackupFile()` for more details and an example.
printf  

C-style formatted output

Description

C-style formatted output.

Usage

```r
# Default S3 method:
printf(fmt, ..., sep = "", file = "")
```

Arguments

- `fmt`: A character vector of format strings. See same argument for `sprintf()`.
- `...`: Additional arguments `sprintf()`.
- `sep`: A character vector of strings to append after each element.
- `file`: A connection, or a character of a file to print to. See same argument for `cat()`.

Value

Returns nothing.

Author(s)

Henrik Bengtsson

See Also

For C-style formatting of character strings, see `sprintf()`.

Examples

```r
cat("Hello world\n")
printf("Hello world\n")

x <- 1.23
cat(sprintf("x=%.2f\n", x))
printf("x=%.2f\n", x)

ty <- 4.56
cat(sprintf(c("x=%.2f\n", "y=%.2f\n"), c(x, y), sep = ""))
printf(c("x=%.2f\n", "y=%.2f\n"), c(x, y))
```
Description

Package: R.utils

Class ProgressBar

Object
```
~|  
~+-ProgressBar

Directly known subclasses:
FileProgressBar

public static class ProgressBar
extends Object

Usage

ProgressBar(max=100, ticks=10, stepLength=1, newlineWhenDone=TRUE)

Arguments

max                  The maximum number of steps.
ticks               Put visual "ticks" every ticks step.
stepLength          The default length for each increase.
newlineWhenDone      If TRUE, a newline is outputted when bar is updated, when done, otherwise not.

Fields and Methods

Methods:

- as.character: Gets a string description of the progress bar.
- getBarString: Gets the progress bar string to be displayed.
- increase: Increases (steps) progress bar.
- isDone: Checks if progress bar is completed.
- reset: Reset progress bar.
- setMaxValue: Sets maximum value.
- setProgress: Sets current progress.
- setStepLength: Sets default step length.
- setTicks: Sets values for which ticks should be visible.
- setValue: Sets current value.
pushBackupFile

Appends a backup suffix to the pathname

Description

Appends a backup suffix to the pathname and, optionally, renames an existing file accordingly.

In combination with `popBackupFile()`, this method is useful for creating a backup of a file and restoring it.

Methods inherited from Object:

Methods inherited from Object:

$<-, $<-.as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCodex, ll, load, names, objectSize, print, save

Author(s)

Henrik Bengtsson

Examples

# A progress bar with default step length one.
pb <- ProgressBar(max=42)
reset(pb)
while (!isDone(pb)) {
  x <- rnorm(3e4)
  increase(pb)
  # Emulate a slow process
  if (interactive()) Sys.sleep(0.02)
}  
cat("\n")

# A "faster" progress bar with default step length 1.4.
pb <- ProgressBar(max=42, stepLength=1.4)
reset(pb)
while (!isDone(pb)) {
  x <- rnorm(3e4)
  increase(pb)
  # Emulate a slow process
  if (interactive()) Sys.sleep(0.02)
}  
cat("\n")
pushBackupFile

Usage

```r
## Default S3 method:
pushBackupFile(filename, path=NULL, suffix=".bak", isFile=TRUE,
onMissing=c("ignore", "error"), copy=FALSE, overwrite=TRUE, ..., verbose=FALSE)
```

Arguments

- **filename**: The filename of the file to backup.
- **path**: The path of the file.
- **suffix**: The suffix to be appended.
- **isFile**: If `TRUE`, the file must exist and will be renamed on the file system. If `FALSE`, it is only the pathname string that will be modified. For details, see below.
- **onMissing**: A character string specifying what to do if the file does not exist.
- **copy**: If `TRUE`, an existing original file remains after creating the backup copy, otherwise it is dropped.
- **overwrite**: If `TRUE`, any existing backup files are overwritten, otherwise an exception is thrown.
- **verbose**: A logical or `verbose`.

Value

Returns the pathname with the suffix appended.

Author(s)

Henrik Bengtsson

See Also

`popBackupFile()`.

Examples

```r
# Create a file
pathname <- "foobar.txt";
cat(file=pathname, "File v1\n")

# (a) Backup and restore a file
#-----------------------------------------------
# Turn it into a backup file
pathnameB <- pushBackupFile(pathname, verbose=TRUE);
print(pathnameB);

# Restore main file from backup
pathnameR <- popBackupFile(pathnameB, verbose=TRUE);
```
pushTemporaryFile

Appends a temporary suffix to the pathname

Description

Appends a temporary suffix to the pathname and, optionally, renames an existing file accordingly.

In combination with `popTemporaryFile()`, this method is useful for creating a file/writing data to file atomically, by first writing to a temporary file which is the renamed. If for some reason the generation of the file was interrupted, for instance by a user interrupt or a power failure, then it is only the temporary file that is incomplete.

Usage

```r
## Default S3 method:
pushTemporaryFile(filename, path=NULL, suffix=".tmp", isFile=FALSE, ..., verbose=FALSE)
```

Arguments

- `filename` The filename of the file.
- `path` The path of the file.
- `suffix` The suffix to be appended.
- `isFile` If `TRUE`, the file must exist and will be renamed on the file system. If `FALSE`, it is only the pathname string that will be modified. For details, see below.
- `...` Not used.
- `verbose` A logical or `Verbose`.
Details

If `isFile` is `FALSE`, the pathname where the suffix of the temporary pathname has been added is returned. If `isFile` is `TRUE`, the file is also renamed. Then, if the file does not exist or it was not successfully renamed, an exception is thrown.

Value

Returns the pathname with the suffix appended.

Author(s)

Henrik Bengtsson

See Also

`popTemporaryFile()`

Examples

```r
createAtomically <- function(pathname, ...) {
  cat("Pathname: ", pathname, "\n", sep="");

  # Generate a file atomically, i.e. the file will either be complete or not created at all. If interrupted while writing, only a temporary file will exist/remain.
  pathnameT <- pushTemporaryFile(pathname);
  cat("Temporary pathname: ", pathnameT, "\n", sep="");

  cat(file=pathnameT, "This file was created atomically:\n");
  for (kk in 1:10) {
    cat(file=pathnameT, kk, "\n", append=TRUE);
    # Emulate a slow process
    if (interactive()) Sys.sleep(0.1)
  }
  cat(file=pathnameT, "END OF FILE\n", append=TRUE);

  # Rename the temporary file
  pathname <- popTemporaryFile(pathnameT);

  pathname;
} # createAtomically()

pathname <- tempfile();

tryCatch({
  # Try to interrupt the process while writing...
  pathname <- createAtomically(pathname);
}, interrupt=function(intr) {
  str(intr);
})
```
queryRCmdCheck

# ...and this will throw an exception
bfr <- readLines(pathname);
cat(bfr, sep="\n");

queryRCmdCheck  Gets the on R CMD check if the current R session was launched by it

Description

Gets the on R CMD check if the current R session was launched by it.

Usage

queryRCmdCheck(...)

Arguments

...  Not used.

Value

Returns character string "checkingTests" if `R CMD check` runs one of the package tests, and "checkingExamples" if it runs one of the package examples. If the current R session was not launched by `R CMD check`, then "notRunning" is returned.

Limitations

This function only works if the working directory has not been changed.

Author(s)

Henrik Bengtsson

Examples

status <- queryRCmdCheck()
if (status != "notRunning") {
  cat("The current R session was launched by R CMD check. Status: ", status, "\n")
} else {
  cat("The current R session was not launched by R CMD check.\n")
}

# Display how R was launched
print(base::commandArgs())

# Display loaded packages etc.
print(search())
# Display current working directory
print(getwd())

---

**readBinFragments**  
*Reads binary data from disjoint sections of a connection or a file*

### Description

Reads binary data from disjoint sections of a connection or a file.

### Usage

```r
## Default S3 method:
readBinFragments(con, what, idxs=1, origin=c("current", "start"), size=NA, ..., verbose=FALSE)
```

### Arguments

- **con**: A *connection* or the pathname of an existing file.
- **what**: A *character* string or an object specifying the the data type (*mode(*) to be read.
- **idxs**: A *vector* of (non-duplicated) indices or a N×2 *matrix* of N from-to index intervals specifying the elements to be read. Positions are either relative to the start or the current location of the file/connection as given by argument *origin*.
- **origin**: A *character* string specify whether the indices in argument *idxs* are relative to the "start" or the "current" position of the file/connection.
- **size**: The size of the data type to be read. If *NA*, the natural size of the data type is used.
- **...**: Additional arguments passed to *readBin()*.
- **verbose**: A *logical* or a *Verbose* object.

### Value

Returns a *vector* of the requested *mode()*.

### Author(s)

Henrik Bengtsson

### See Also

`writeBinFragments()`.
Examples

```r
# Create a data file
data <- 1:255
size <- 2
pathname <- tempfile("exampleReadBinFragments")
writeBin(con=pathname, data, size=size)

# Read and write using index vectors
idxs <- seq(from=1, to=255, by=16)
x <- readBinFragments(pathname, what="integer", size=size, signed=FALSE, idxs=idxs)
stopifnot(identical(x, data[idxs]))
print(x)

# Read every 16:th byte in the file
idxs <- idxs + 5L;
x <- readBinFragments(pathname, what="integer", size=size, signed=FALSE, idxs=idxs)
stopifnot(identical(x, data[idxs]))
print(x)

# Update every 16:th byte in the file
idxs <- seq(from=1, to=255, by=16)
writeBinFragments(pathname, idxs=idxs, rev(x0), size=size)
x <- readBinFragments(pathname, what="integer", size=size, signed=FALSE, idxs=idxs)
print(x)
stopifnot(identical(rev(x0), x))

# Assert everything is as expected
x <- readBin(pathname, what="integer", size=size, signed=FALSE, n=length(data))
stopifnot(identical(x, data))
cat("Write file...done\n")
```

# Ditto but via a connection
```
cat("Read connection...\n")
# Read every 16:th byte in a connection
con <- file(pathname, open="rb")
idxs <- seq(from=1, to=255, by=16)
x <- readBinFragments(con, what="integer", size=size, signed=FALSE, idxs=idxs)
stopifnot(identical(x, data[idxs]))
print(x)

# Read every 16:th byte in a connection starting with the 6th.
idxs <- idxs + 5L;
x <- readBinFragments(con, what="integer", size=size, signed=FALSE, idxs=idxs, origin="start")
stopifnot(identical(x, data[idxs]))
print(x)
close(con)
cat("Read connection...done\n")

# Update every 16:th byte in a connection

cat("Write connection...\n")
con <- file(pathname, open="r+b")
idxs <- seq(from=1, to=255, by=16)
0x <- data[idxs]
writeBinFragments(pathname, idxs=idxs, rev(0x), size=size)
x <- readBinFragments(pathname, what="integer", size=size, signed=FALSE, idxs=idxs)
print(x)
stopifnot(identical(rev(0x), x))

# Update every 16:th byte in the file
idxs <- seq(from=1, to=255, by=16)
writeBinFragments(pathname, idxs=idxs, rev(x), size=size)
x <- readBinFragments(pathname, what="integer", size=size, signed=FALSE, idxs=idxs, origin="start")
print(x)
stopifnot(identical(x0, x))
close(con)

# Assert everything is as expected
# Read the complete file
x <- readBin(pathname, what="integer", size=size, signed=FALSE, n=length(data))
stopifnot(identical(x, data))
cat("Write connection...done\n")

# -----------------------------
# Clean up
# -----------------------------
file.remove(pathname)

---

readRdHelp *Reads one or more Rd help files in a certain format*
readTable

Description
Reads one or more Rd help files in a certain format.

Usage

```r
## Default S3 method:
readRdHelp(..., format=c("text", "html", "latex", "rd"), drop=TRUE)
```

Arguments

- `...` Arguments passed to `help`.
- `format` A character string specifying the return type.
- `drop` If `FALSE` or more than one help entry is found, the result is returned as a list.

Value
Returns a list of character strings or a single character string.

Author(s)
Henrik Bengtsson

---

readTable

*Reads a file in table format*

Description
Reads a file in table format and creates a data frame from it, with cases corresponding to lines and variables to fields in the file.

*WARNING: This method is very much in an alpha stage. Expect it to change.*

This method is an extension to the default `read.table` function in R. It is possible to specify a column name to column class map such that the column classes are automatically assigned from the column header in the file.

In addition, it is possible to read any subset of rows. The method is optimized such that only columns and rows that are of interest are parsed and read into R’s memory. This minimizes memory usage at the same time as it speeds up the reading.

Usage

```r
## Default S3 method:
readTable(file, colClasses=NULL, isPatterns=FALSE, defColClass=NA, header=FALSE, skip=0,
nrows=-1, rows=NULL, col.names=NULL, check.names=FALSE, path=NULL, ..., stripQuotes=TRUE, method=c("readLines", "intervals"), verbose=FALSE)
```
Arguments

file A connection or a filename. If a filename, the path specified by path is added to the front of the filename. Unopened files are opened and closed at the end.

colClasses Either a named or an unnamed character vector. If unnamed, it specified the column classes just as used by read.table. If it is a named vector, names(colClasses) are used to match the column names read (this requires that header=TRUE) and the column classes are set to the corresponding values.

isPatterns If TRUE, the matching of names(colClasses) to the read column names is done by regular expressions matching.

defColClass If the column class map specified by a named colClasses argument does not match some of the read column names, the column class is by default set to this class. The default is to read the columns in an "as is" way.

header If TRUE, column names are read from the file.

skip The number of lines (commented or non-commented) to skip before trying to read the header or alternatively the data table.

nrows The number of rows to read of the data table. Ignored if rows is specified.

rows An row index vector specifying which rows of the table to read, e.g. row one is the row following the header. Non-existing rows are ignored. Note that rows are returned in the same order they are requested and duplicated rows are also returned.

col.names Same as in read.table().

check.names Same as in read.table(), but default value is FALSE here.

path If file is a filename, this path is added to it, otherwise ignored.

... Arguments passed to read.table used internally.

stripQuotes If TRUE, quotes are stripped from values before being parse. This argument is only effective when method="readLines".

method If "readLines", (readLines()) is used internally to first only read rows of interest, which is then passed to read.table(). If "intervals", contiguous intervals are first identified in the rows of interest. These intervals are the read one by one using read.table(). The latter methods is faster and especially more memory efficient if the intervals are not too many, where as the former is preferred if many "scattered" rows are to be read.

verbose A logical or a Verbosity object.

Value

Returns a data.frame.

Author(s)

Henrik Bengtsson

See Also

readTableIndex(). read.table.colClasses().
readTableIndex  

Reads a single column from file in table format

Description

Reads a single column from file in table format, which can then be used as an index-to-row (look-up) map for fast access to a subset of rows using `readTable()`.

Usage

```r
## Default S3 method:
readTableIndex(..., indexColumn=1, colClass="character", verbose=FALSE)
```

Arguments

- `indexColumn`: An single integer of the index column.
- `colClass`: A single character specifying the class of the index column.
- `...`: Arguments passed to `readTable()` used internally.
- `verbose`: A logical or a `Verbose` object.

Value

Returns a vector.

Author(s)

Henrik Bengtsson

See Also

`readTable()`.

Examples

```r
## Not run:
# File containing data table to be access many times
filename <- "somefile.txt"

# Create a look-up index
index <- readTableIndex(filename)

# Keys of interest
keys <- c("foo", "bar", "wah")

# Read only those keys and do it fast
df <- readTable(filename, rows=match(keys, index))

## End(Not run)
```
readWindowsShortcut  

Reads a Microsoft Windows Shortcut (.lnk file)

Description
Reads a Microsoft Windows Shortcut (.lnk file).

Usage

## Default S3 method:
readWindowsShortcut(con, verbose=FALSE, ...)

Arguments

- `con`: A connection or a character string (filename).
- `verbose`: If TRUE, extra information is written while reading.
- `...`: Not used.

Details

The MIME type for a Windows Shortcut file is application/x-ms-shortcut.

Value

Returns a list structure.

Author(s)

Henrik Bengtsson

References

http://groups.google.com/group/comp.lang.java.help/browse_thread/thread/a2e147b07d5480a2/1844
removeDirectory

Removes a directory

Description

Removes a directory, and if requested, also its contents.

Usage

## Default S3 method:
removeDirectory(path, recursive=FALSE, mustExist=TRUE, ...)

Arguments

- **path**: A character string specifying the directory to be removed.
- **recursive**: If TRUE, subdirectories and files are also removed. If FALSE, and directory is non-empty, an exception is thrown.
- **mustExist**: If TRUE, and the directory does not exist, an exception is thrown.
- **...**: Not used.

Value

Returns (invisibly) TRUE, the directory was successfully removed, otherwise FALSE, unless an exception is thrown.

Symbolic links

This function can also be used to remove symbolic links to directories without removing the target. Note that neither file.remove() nor unlink() is capable of remove symbolic directory links on Windows.

See Also

createWindowsShortcut() and filePath()

Examples

```r
pathname <- system.file("data-ex/HISTORY.LNK", package="R.utils")
link <- readWindowsShortcut(pathname)

# Print all information
print(link)

# Get the relative path to the target file
history <- file.path(dirname(pathname), link$relativePath)

# Alternatively, everything in one call
history <- filePath(pathname, expandLinks="relative")
```
resample

Sample values from a set of elements

Description
Sample values from a set of elements. Contrary to `sample()`, this function also works as expected when there is only one element in the set to be sampled, cf. [1]. This function originates from the example code of `sample()` as of R v2.12.0.

Usage
```r
## Default S3 method:
resample(x, ...)  
```

Arguments
- `x` A vector of any length and data type.
- `...` Additional arguments passed to `sample.int()`.

Value
Returns a sampled vector of the same data types as argument `x`.

Author(s)
Henrik Bengtsson

References

See Also
Internally `sample.int()` is used.
saveObject

**Description**

Saves an object to a file or a connection.

**Usage**

```r
## Default S3 method:
saveObject(object, file=NULL, path=NULL, format=c("auto", "xdr", "rds"), compress=TRUE, ...
... , safe=TRUE)
```

**Arguments**

- **object**: The object to be saved.
- **file**: A filename or connection where the object should be saved. If NULL, the filename will be the hash code of the object plus ".xdr".
- **path**: Optional path, if file is a filename.
- **format**: File format.
- **compress**: If TRUE, the file is compressed to, otherwise not.
- **...**: Other arguments accepted by save() in the base package.
- **safe**: If TRUE and file is a file, then, in order to lower the risk for incomplete files, the object is first written to a temporary file, which is then renamed to the final name.

**Value**

Returns (invisibly) the pathname or the connection.

**Author(s)**

Henrik Bengtsson

**See Also**

loadObject() to load an object from file. digest for how hash codes are calculated from an object. See also saveRDS().
**seqToHumanReadable**

*Gets a short human readable string representation of an vector of indices*

---

**Description**

Gets a short human readable string representation of an vector of indices.

**Usage**

```r
## Default S3 method:
seqToHumanReadable(idx, tau=2L, delimiter="-", collapse="", ",", ...) 
```

**Arguments**

- `idx` A vector of integer indices.
- `tau` A non-negative integer specifying the minimum span of of a contiguous sequences for it to be collapsed to `<from>-<to>`.
- `delimiter` A character string delimiter.
- `collapse` A character string used to collapse subsequences.
- `...` Not used.

**Author(s)**

Henrik Bengtsson

**See Also**

Internally, `seqToIntervals()` is used.

**Examples**

```r
print(seqToHumanReadable(1:2))  # "1, 2"
print(seqToHumanReadable(1:2, tau=1))  # "1-2"
print(seqToHumanReadable(1:10))  # "1-10"
print(seqToHumanReadable(c(1:10, 15:18, 20)))  # "1-10, 15-18, 20"
```
**seqToIntervals**

*Gets all contiguous intervals of a vector of indices*

---

**Description**

Gets all contiguous intervals of a vector of indices.

**Usage**

```r
## Default S3 method:
seqToIntervals(idx, ...)
```

**Arguments**

- `idx` A vector of N integer indices.
- `...` Not used.

**Value**

An Nx2 integer matrix.

**Author(s)**

Henrik Bengtsson

**See Also**

`intervalsToSeq()`. To identify sequences of equal values, see `rle()`.

**Examples**

```r
x <- 1:10
y <- seqToIntervals(x)
print(y) # [1 10]

x <- c(1:10, 15:18, 20)
y <- seqToIntervals(x)
print(y) # [1 10; 15 18; 20 20]

z <- intervalsToSeq(y)
print(z)
stopifnot(all.equal(x, z))
```
setOption  

Sets a option in R

Description

Sets a option in R by specifying its name as a character string.

Usage

```r
## Default S3 method:
setOption(x, value, ...)
```

Arguments

- `x` The name of the option to be set.
- `value` The new value of the option.
- `...` Not used.

Value

Returns (invisibly) the previous value of the option.

Author(s)

Henrik Bengtsson

See Also

See `getOption()` and "base::options".

Settings

Class for applicational settings

Description

Package: R.utils

Class Settings

```r
Object
```

```r
--- Options
```

```r
-------- Settings
```
Directly known subclasses:

public static class Settings
extends Options

Class for applicational settings.

Usage

Settings(basename=NULL, ...)

Arguments

basename       A character string of the basename of the settings file.
...

Arguments passed to constructor of superclass Options.

Fields and Methods

Methods:

  findSettings   Searches for the settings file in one or several directories.
  getLoadedPathname Gets the pathname of the settings file loaded.
  isModified     Checks if settings has been modified compared to whats on file.
  loadAnywhere   Loads settings from file.
  promptAndSave  Prompt user to save modified settings.
  saveAnywhere   Saves settings to file.

Methods inherited from Options:
as.character, as.list, equals, getLeaves, getOption, hasOption, names, nbrOfOptions, setOption, str

Methods inherited from Object:
$.$<-, $.][<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach,
equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstanceationTime,
getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Load settings with package and save on exit

Here is a generic .First.lib() function for loading settings with package. It also (almost) assures
that the package is detached when R finishes. See onSessionExit() why it is not guaranteed!
The almost generic .Last.lib() function, which will prompt user to save settings, is called when
a package is detached.

It is custom to put these functions in a file named zzz.R.

.First.lib():

  .First.lib <- function(libname, pkgname) {
# Write a welcome message when package is loaded
pkg <- Package(pkgname)
assign(pkgname, pkg, pos=getPosition(pkg))

# Read settings file ".<pkgname>Settings" and store it in package
# variable '<pkgname>Settings'.
varname <- paste(pkgname, "Settings")
basename <- paste( ".", varname, sep="")
settings <- Settings\$loadAnywhere(basename, verbose=TRUE)
if (is.null(settings))
  settings <- Settings(basename)
assign(varname, settings, pos=getPosition(pkg))

# Detach package when R finishes, which will save package settings too.
onSessionExit(function(...) detachPackage(pkgname))

packageStartupMessage(getName(pkg), " v", getVersion(pkg),
  ", getDate(pkg), ") successfully loaded. See ", pkgname,
  " for help.\n", sep="")
} # .First.lib()

.Last.lib():

.Last.lib <- function(libpath) {
  pkgname <- "<package name>"

  # Prompt and save package settings when package is detached.
  varname <- paste(pkgname, "Settings", sep="")
  if (exists(varname)) {
    settings <- get(varname)
    if (inherits(settings, "Settings"))
      promptAndSave(settings)
  }
} # .Last.lib()

Author(s)
Henrik Bengtsson

Examples
# Load settings from file, or create default settings
basename <- "some.settings"
settings <- Settings\$loadAnywhere(basename)
if (is.null(settings))
  settings <- Settings(basename)

# Set default options, if missing.
```r
setOption(settings, "graphics/verbose", TRUE, overwrite=FALSE)
setOption(settings, "io/verbose", Verbose(threshold=-1), overwrite=FALSE)

# Save and reload settings
path <- tempdir()
saveAnywhere(settings, path=path)
settings2 <- Settings$loadAnywhere(basename, paths=path)

# Clean up
file.remove(getLoadedPathname(settings2))

# Assert correctness
stopifnot(equals(settings, settings2))
```

---

**shell.exec2**

*Open a file or URL using Windows File Associations*

**Description**

Open a file or URL using Windows File Associations using `shell.exec()` but makes some tweaks to filenames to make them more likely to be opened properly.

*This function is only applicable on Windows systems.*

**Usage**

```r
shell.exec2(file)
```

**Arguments**

- `file` *A character* string specifying a file or an URL.

**Details**

Before passing a `file` on the file system to `shell.exec()`, this function: (i) unmaps any mapped drive letters used in the pathname (e.g. 'X:/foo.bar.html' to 'C:/Users/Joe/bar.html'), (ii) and replaces any forward slashed with backward ones (e.g. 'C:/Users/Joe/bar.html' to 'C:\Users\Joe\bar.html').

URLs are passed as is to `shell.exec()`.

The reason for (i) is that some web browsers (e.g. Google Chrome) will not open files on mapped drives. The reason for (ii) is that if forward slashes are used, then `shell.exec()` will give an error that the file was not found (at least with the default Windows shell).

**Value**

Returns nothing.
Setting on startup

The intended usage of this function is to set it as the default browser for `browserURL`. Just add the following to your `.Renviron` file:

```r
if (.Platform$OS.type == "windows")
  options(browser=function(...) R.utils::shell.exec2(....))
```

This will only load (not attach) the `R.utils` package when the browser function is actual used.

Author(s)

Henrik Bengtsson

---

**SmartComments**

Abstract class `SmartComments`

Description

Package: `R.utils`

Class `SmartComments`

```r
Object
```

```r
~|~~
```

```r
~|~~---SmartComments
```

Directly known subclasses:

`LComments`, `VComments`

public abstract static class `SmartComments`

extends `Object`

Abstract class `SmartComments`.

Usage

```r
SmartComments(letter=NA, ...)
```

Arguments

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>letter</td>
<td>A single <code>character</code>.</td>
</tr>
<tr>
<td>...</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Details

A "smart" source-code comment is an R comment, which start with a `\#`, but is followed by a single letter, then a single symbol and a second `\#` and then an option character string, and there must not be any code before the comment on the same line. In summary, a smart comment line has format: `<white spaces>`#<letter><symbol># <some text>.

Example code with two smart comments (VComments):

```r
x <- 2
#VI# threshold=-1
#Vc# A v-comment log message
cat("Hello world")
```

which after compilation becomes

```r
x <- 2
verbose <- Verbose(threshold=-1)
if (verbose) { cat(verbose, "A v-comment log message"); }
cat("Hello world")
```

Fields and Methods

Methods:

- **compile**: Preprocess a vector of code lines.
- **convertComment**: Converts a single smart comment to R code.
- **parse**: Parses one single smart comment.
- **reset**: Resets a SmartComments compiler.
- **validate**: Validates the compiled lines.

Methods inherited from Object:

$`, `$<-, `[`, `[<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)

Henrik Bengtsson

See Also

VComments.
sourceDirectory

Sources files recursively to either local or global environment.

### Description

Sources files recursively to either local or global environment.

### Usage

```r
## Default S3 method:
sourceDirectory(path, pattern = ".*\(r|R|s|S|q)\([.](lnk|LNN)\)\)*", recursive = TRUE,
   envir = parent.frame(), on.error = c("error", "warning", "skip"), modifiedOnly = TRUE, ...
   verbose = FALSE)
```

### Arguments

- **path**
  A path to a directory to be sourced.

- **pattern**
  A regular expression file name pattern to identify source code files.

- **recursive**
  If `TRUE`, subdirectories are recursively sourced first, otherwise not.

- **envir**
  An environment in which the code should be evaluated.

- **on.error**
  If an error occurs, the error may stop the job, give a warning, or silently be skipped.

- **modifiedOnly**
  If `TRUE`, only files that are modified since the last time they were sourced are sourced, otherwise regardless.

- **...**
  Additional arguments passed to `sourceTo()`.

- **verbose**
  A logical or a `Verbose` object.

### Value

Returns a vector of the full pathnames of the files sourced.

### Details

Subdirectories and files in each (sub-)directory are sourced in lexicographic order.

### Hooks

This method does not provide hooks, but the internally used `sourceTo()` does.

### Author(s)

Henrik Bengtsson

### See Also

- `sourceTo()` and compare to `source()`.
sourceTo

Parses and evaluates code from a file or a connection

Description

Parses and evaluates code from a file or a connection. This has the same effect as if source(..., local=TRUE) would have been called from within the given environment. This is useful when setting up a new local working environment.

Usage

```r
## Default S3 method:
sourceTo(file, path=NULL, chdir=FALSE, ..., local=TRUE, envir=parent.frame(), modifiedOnly=FALSE)
```

Arguments

- **file**: A connection or a character string giving the pathname of the file or URL to read from.
- **path**: An optional character string giving the path to the file. Ignored if file is a connection.
- **chdir**: If TRUE and file is a pathname, the R working directory is temporarily changed to the directory containing file for evaluating.
- **...**: Arguments to source(). If argument file is not explicitly given, the first argument is assumed to be the file argument. This argument is converted into a string by as.character().
- **local**: If FALSE, evaluation is done in the global environment, otherwise in the calling environment.
- **envir**: An environment in which source() should be called. If NULL, the global environment is used.
- **modifiedOnly**: If TRUE, the file is sourced only if modified since the last time it was sourced, otherwise regardless.

Value

Return the result of source().

Hooks

This method recognizes the hook sourceTo/onPreprocess, which is called after the lines in file has been read, but before they have been parsed by the R parser, cf. parse(). An onPreprocess hook function should take a character vector of code lines and return a character vector of code lines. This can for instance be used to pre-process R source code with special directives such as VComments.

Note that only one hook function can be used for this function, otherwise an error is generated.
Author(s)
Henrik Bengtsson

See Also

sourceDirectory(), sys.source() and source().

Examples

```r
# Example 1

cat("=== Example 1 ====

foo <- function(file, ...) {
  cat("Local objects before calling sourceTo():\n")
  print(ls())

  res <- sourceTo(file, ...)

  cat("Local objects after calling sourceTo():\n")
  print(ls())
}

cat("Global objects before calling foo():\n")
lsBefore <- NA
lsBefore <- ls()
foo(file=textConnection(c('a <- 1', 'b <- 2')))  
cat("Global objects after calling foo():\n")
stopifnot(length(setdiff(ls(), lsBefore)) == 0)

# Example 2 - with VComments preprocessor

preprocessor <- function(lines, ...) {
  cat("= Preprocessor =\n")
  cat("Source code before preprocessing:\n")
  displayCode(code=lines, pager="console")
  cat("= Preprocessor =\n")
  cat("Source code after preprocessing:\n")
  lines <- VComments$compile(lines)
  displayCode(code=lines, pager="console")
  cat("= Preprocessor =\n")
  lines
}

oldHooks <- getHook("sourceTo/onPreprocess")
ssetHook("sourceTo/onPreprocess", preprocessor, action="replace")
```

splitByPattern

Splits a single character string by pattern

Description

Splits a single character string by pattern. The main difference compared to `strsplit()` is that this method also returns the part of the string that matched the pattern. Also, it only takes a single character string.

Usage

```r
## Default S3 method:
splitByPattern(str, pattern, ...)
```

Arguments

- `str` A single character string to be split.
- `pattern` A regular expression character string.
- `...` Not used.

Value

Returns a named character vector with names equal to "TRUE" if element is a pattern part and "FALSE" otherwise.

Author(s)

Henrik Bengtsson

See Also

Compare to `strsplit()`.

Examples

```r
code <- c(
  'x <- 2',
  '#V1# threshold=-1',
  '#Vc# A v-comment log message',
  'print("Hello world")'
)
fh <- textConnection(code)
sourceTo(fh)
setHook("sourceTo/onPreprocess", oldHooks, action="replace")

splitByPattern

rsCode <- "<body>Hello <%="world"%></body>"
rsParts <- splitByPattern(rsCode, pattern="<%.*%>")
cat(rsCode, "\n")
print(rsParts)
```


**stext**

*Writes text in the margin along the sides of a plot*

---

### Description

Writes text in the margin along the sides of a plot.

### Usage

```r
## Default S3 method:
stext(text, side=1, line=0, pos=0.5, margin=c(0.2, 0.2),
   charDim=c(strwidth("M", cex = cex), strheight("M", cex = cex)), cex=par("cex"), ...)
```

### Arguments

- **text**: The text to be written. See `mtext` for details.
- **side**: An `integer` specifying which side to write the text on. See `mtext` for details.
- **line**: A `numeric` specifying on which line to write on.
- **pos**: A `numeric`, often in [0,1], specifying the position of the text relative to the left and right edges.
- **margin**: A `numeric vector` length two specifying the text margin.
- **charDim**: A `numeric vector` length two specifying the size of a typical symbol.
- **cex**: A `numeric` specifying the character expansion factor.
- **...**: Additional arguments passed to `mtext`.

### Value

Returns what `mtext` returns.

### Author(s)

Henrik Bengtsson

### See Also

Internally `mtext` is used.
subplots

Creates a grid of subplots

Description

Creates a grid of subplots in the current figure. If arguments \texttt{nrow} and \texttt{ncol} are given a \texttt{nrow}-by- \texttt{ncol} grid of subplots are created. If only argument \texttt{n} is given then a \texttt{r}-by-\texttt{s} grid is created where \texttt{|r-s| <= 1}, i.e. a square or almost a square of subplots is created. If \texttt{n} and \texttt{nrow} is given then a grid with \texttt{nrow} rows and at least \texttt{n} subplots are created. Similar if \texttt{n} and \texttt{ncol} is given. The argument \texttt{byrow} specifies if the order of the subplots should be rowwise (\texttt{byrow=TRUE}) or columnwise.

Usage

```r
## Default S3 method:
subplots(n=1, nrow=NULL, ncol=NULL, byrow=TRUE, ...)
```

Arguments

- \texttt{n} If given, the minimum number of subplots.
- \texttt{nrow} If given, the number of rows the grid of subplots should contain.
- \texttt{ncol} If given, the number of columns the grid of subplots should contain.
- \texttt{byrow} If \texttt{TRUE}, the panels are ordered row by row in the grid, otherwise column by column.
- \texttt{...} Not used.

Value

Returns the \texttt{matrix} containing the order of plots.

Author(s)

Henrik Bengtsson

See Also

\texttt{layout} and \texttt{layout.show}.

Examples

```r
subplots(nrow=2, ncol=3)  # 2-by-3 grid of subplots
subplots(n=6, nrow=2)    # 2-by-3 grid of subplots
subplots(n=5, ncol=2)    # 3-by-2 grid of subplots
subplots(1)              # (Reset) to a 1-by-1 grid of subplots
subplots(2)              # 1-by-2 grid of subplots
subplots(3)              # 2-by-2 grid of subplots
1 <- subplots(8)         # 3-by-3 grid of subplots
layout.show(length(1))
```
System

Static class to query information about the system

Description

Package: R.utils

Class System

Object

Directly known subclasses:

public static class System
extends Object

The System class contains several useful class fields and methods. It cannot be instantiated.

Fields and Methods

Methods:

currentTimeMillis
findGhostscript
findGraphicsDevice
getHostName
getMappedDrivesOnWindows
getUsername
mapDriveOnWindows
openBrowser
parseDebian
unmapDriveOnWindows

Methods inherited from Object:
$, $<-, [], [[<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach,
equals, extend, finalize, getEnvironment, getFieldValue, getFieldModifiers, getFields, getInstantiationTime,
getInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)

Henrik Bengtsson
Launches another R process from within R

Description

Launches another R process from within R via `system()` by automatically locating the R executable, cf [1].

Usage

```r
## Default S3 method:
systemR(command="", ..., Rcommand="R", verbose=FALSE)
```

Arguments

- `command`: A character string be appended to the `system()` call. If a vector, then the strings are concatenated separated with a space.
- `...`: Additional arguments passed to `system()`.
- `Rcommand`: A character string specifying the basename of the R executable.
- `verbose`: A logical or a `Verbose` object.

Value

Returns what `system()` returns.

Author(s)

Henrik Bengtsson

References


See Also

The R executable is located using `R.home()`, which is then launched using `system()`.

Examples

```r
res <- systemR("--slave -e cat(runif(1))", intern=TRUE)
cat("A random number: ", res, "\n", sep="")
```
Description

Package: R.utils
Class TextStatusBar

Object
~~|
~~+---TextStatusBar

Directly known subclasses:

public static class TextStatusBar
extends Object

A status bar at the R prompt that can be updated.

Usage

TextStatusBar(fmt=paste("%-", getOption("width") - 1, "s", sep = ""), ...)

Arguments

fmt A character format string to be used by sprintf(). Default is a left-aligned string of full width.

Details

A label with name hfill can be used for automatic horizontal filling. It must be numeric and be immediate before a string label such that a hfill label and the following string label together specifies an sprintf format such as "%-s". The value of hfill will be set such that the resulting status bar has width equal to getOption("width")-1 (the reason for the -1 is to prevent the text status bar from writing into the next line). If more than one hfill label is used their widths will be uniformly distributed. Left over spaces will be distributed between hfill labels with initial values of one.

Fields and Methods

Methods:

flush Flushes the output.
getLabel Gets the current value of a label.
newline Writes a newline.
popMessage Adds a message above the status bar.
setLabel Sets the value of a label.
setLabels Sets new values of given labels.
update Updates the status bar (visually).
updatelabels Sets the new values of given labels and updates the status bar.

Methods inherited from Object:
$, $<-, [], [[]<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach,
equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime,
getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Author(s)
Henrik Bengtsson

Examples

# -------------------------------
# Read all HTML files in the base package
# -------------------------------
path <- system.file(package="base")
files <- list.files(path, recursive=TRUE, full.names=TRUE)
files <- files[sapply(files, FUN=isFile)]
nfiles <- length(files)

cat(sprintf("Reading %d files in %s:\n", nfiles, path))

# Create a status bar with four labels
sb <- TextStatusBar("File: %s %3.0f%% %7.0f bytes %8s",
                   hfill=1, file="", progress=0, nbytes=0L, time="")

nbytes <- 0L
for (kk in seq_len(nfiles)) {
  file <- files[kk]

  # Update the status bar
  if (sb) {
    setLabel(sb, "progress", 100*kk/nfiles)
    if (kk %% 10 == 1 || kk == nfiles)
      setLabel(sb, "file", substr(basename(file), 1, 44))

    size <- file.info(file)$size
    # popMessage() calls update() too
    popMessage(sb, sprintf("Processing %s (%.2fKB)",
                            basename(file), size/1024))
    flush(sb)
  }
}
# Read the file
bfr <- readBin(file, what="raw", n=size)
nbytes <- nbytes + size

# Emulate a slow process
if (interactive()) Sys.sleep(rexp(1, rate=60))

# Update the status bar
if (sb) {
  setLabel(sb, "nbytes", nbytes)
  setLabel(sb, "time", format(Sys.time(), "%H:%M:%S"))
  update(sb)
}
setLabel(sb, "file", "<done>")
update(sb)
cat("\n")

TimeoutException

TimeoutException represents timeout errors

Description

Package: R.utils

Class TimeoutException

Object

```
---
~~|---try-error
~~~~~|---condition
~~~~~~~~~~|---error
~~~~~~~~~~~~~~~~|---simpleError
~~~~~~~~~~~~~~~~~~|---Exception
~~~~~~~~~~~~~~~~~~~|---TimeoutException
```

Directly known subclasses:

- public static class TimeoutException extends Exception

TimeoutException represents timeout errors occurring when a set of R expressions executed did not finish in time.
**touchFile**

**Usage**

```
TimeoutException(..., cpu=NA, elapsed=NA)
```

**Arguments**

- `...`  
  Any arguments accepted by `Exception`.
- `cpu, elapsed`  
  The maximum time the R expressions were allowed to be running before the timeout occurred as measured in CPU time and (physically) elapsed time.

**Fields and Methods**

**Methods:**

- `getMessage`  
  Gets the message of the exception.

**Methods inherited from Exception:**

- `as.character, getCall, get Calls, getLastException, getMessage, getStackTrace, getWhen, print, printStackTrace, throw`

**Methods inherited from error:**

- `as.character, throw`

**Methods inherited from condition:**

- `abort, as.character, conditionCall, conditionMessage, print`

**Methods inherited from Object:**

- `$, $<-, [., [][<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save`

**Author(s)**

Henrik Bengtsson

**See Also**

For detailed information about exceptions see `Exception`.

---

**touchFile**  
*Updates the timestamp of a file*

**Description**

Updates the timestamp of a file. Currently, it is only possible to change the timestamp specifying when the file was last modified, and time can only be set to the current time.
Usage

```r
## Default S3 method:
touchFile(pathname, ...)
```

Arguments

- `pathname`: A character vector specifying files to be updated.
- `...`: Not used.

Value

Returns (invisibly) a vector of the old timestamps.

Author(s)

Henrik Bengtsson

References


See Also

Internally, `Sys.setFileTime()` (iff available) and `file.info()` are utilized.

Examples

```r
# 1. Create a file
pathname <- tempfile()
cat(file=pathname, "Hello world!")
md5a <- digest::digest(pathname, file=TRUE)

# 2. Current time stamp
ta <- file.info(pathname)$mtime
print(ta)

# 3. Update time stamp
Sys.sleep(1.2)
touchFile(pathname)
tb <- file.info(pathname)$mtime
print(tb)

# 4. Verify that the timestamp got updated
stopifnot(tb > ta)

# 5. Verify that the contents did not change
md5b <- digest::digest(pathname, file=TRUE)
stopifnot(identical(md5a, md5b))
```
toUrl

Converts a pathname into a URL

Description

Converts a pathname into a URL starting with file: //.

Usage

```r
## Default S3 method:
toUrl(pathname, safe=TRUE, ...)
```

Arguments

- `pathname` A character vector of pathnames to be made into URLs.
- `safe` If TRUE, certain “unsafe” characters are escaped.
- `...` Not used.

Value

Returns a character vector.

Author(s)

Henrik Bengtsson

See Also

- `urlencode`.

unwrap.array

Unwrap an array, matrix or a vector to an array of more dimensions

Description

Unwrap an array, matrix or a vector to an array of more dimensions. This is done by splitting up each dimension into several dimension based on the names of that dimension.

Usage

```r
## S3 method for class 'array'
unwrap(x, split=rep("[]", length(dim(x))), drop=FALSE, ...)
```
Arguments

x An array or a matrix.

split A list or a character vector. If a list, it should contain functions that takes a character vector as the first argument and optional ... arguments. Each function should split the vector into a list of same length and where all elements contains the same number of parts. If a character vector, each element split[i]is replaced by a function call function(names, ...) strsplit(names, split=split[i]).

drop If TRUE, dimensions of of length one are dropped, otherwise not.

... Arguments passed to the split functions.

Details

Although not tested thoroughly, unwrap() should be the inverse of wrap() such that identical(unwrap(wrap(x)), x) holds.

Value

Returns an array.

Author(s)

Henrik Bengtsson

See Also

*wrap().

Examples

## Not run: See ?wrap.array for an example

<table>
<thead>
<tr>
<th>useRepos</th>
<th>Sets package repositories</th>
</tr>
</thead>
</table>

Description

Sets package repositories.

Usage

useRepos(repos=NULL, where=c("before", "after", "replace"), unique=TRUE, fallback=TRUE, ...)

useRepos
Arguments

repos A character vector of repositories to use. If NULL, nothing is replaced.
where A character string specifying how to add them to the current set of repositories.
unique If TRUE, only unique repositories are set.
fallback If TRUE, any remaining non-specified repository value of format ’...@’ (e.g. '@CRAN@') than could not be recovered by other means, will be assigned to a pre-defined known value, if possible. If so, then an informative warning is given.
... Not used.

Value

Returns a list with element ‘repos’ reflecting options("repos") as the options where prior to calling this function.

Author(s)

Henrik Bengtsson

See Also

withrepos().

The VComments class

Description

Package: R.utils
Class VComments

Object

|--------
| ~~~~
| ~~~~SmartComments
| ~~~~~|
| ~~~~~~~~~~~VComments

Directly known subclasses:
LComments

public static class VComments
extends SmartComments

The VComments class.
Usage

VComments(letter="V", verboseName="verbose", ...)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>letter</td>
<td>The smart letter.</td>
</tr>
<tr>
<td>verboseName</td>
<td>The name of the verbose object.</td>
</tr>
<tr>
<td>...</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Details

The ‘v’ in VComments stands for ‘verbose’, because of its relationship to the **Verbose** class.

Here is a list of VComments and the R code that replaces each of them by the compiler:

Constructors

- \#V0\#[<args>] - NullVerbose(<args>)
- \#V1\#[<args>] - Verbose(<args>)

Controls

- \#V=#[<variable>] - Sets the name of the <verbose> object. Default is ‘verbose’.
- \#V^=#<threshold> - setThreshold(<verbose>, <threshold>)
- \#V?=#<expression> - if (isVisible(<verbose>)) { <expression> }
- \#V@=#<level> - setDefaultLevel(<verbose>, <level>)
- \#Vm=#<method> <args> - <method>(<verbose>, <args>)

Enters and exits

- \#V+=#[<message>] - enter(<verbose>, <message>)
- \#V-=#[<message>] - exit(<verbose>, <message>)
- \#V!=#[<message>] - pushState(<verbose>)
  on.exit(popState(<verbose>))
  If <message>, enter(<verbose>, <message>)

Simple output

- \#Vn=#<ignored> - newline(<verbose>)
- \#Vr=#<ignored> - ruler(<verbose>)
- \#Vt=#<ignored> - timestamp(<verbose>)
- \#Vw=#[<title>] - warnings(<verbose>, <title>)

Output messages
Fields and Methods

Methods:

- `convertComment` Converts a verbose comment to R code.
- `reset` Resets a VComments compiler.
- `validate` Validates the compiled lines.

Methods inherited from SmartComments:
- `compile`, `convertComment`, `parse`, `reset`, `validate`

Methods inherited from Object:
- `$`, `$<->`, `[`, `[<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save`

Author(s)

Henrik Bengtsson

Examples

```r
filename <- system.file("data-ex/exampleVComments.R", package="R.utils")
lines <- readLines(filename)

cat("Code before preprocessing:\n")
displayCode(code=lines, pager="console")

lines <- VComments$compile(lines)

cat("Code after preprocessing:\n")
displayCode(code=lines, pager="console")
```

---

**Verbose**

*Class to writing verbose messages to a connection or file*
Description

Package: R.utils

Class Verbose

Object

~| Verbose

Directly known subclasses:
MultiVerbose, NullVerbose

public static class Verbose extends Object

Class to writing verbose messages to a connection or file.

Usage

Verbose(con=stderr(), on=TRUE, threshold=0, asGString=TRUE, timestamp=FALSE, removeFile=TRUE, core=TRUE, ...)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>con</td>
<td>A connection or a character string filename.</td>
</tr>
<tr>
<td>on</td>
<td>A logical indicating if the writer is on or off.</td>
</tr>
<tr>
<td>threshold</td>
<td>A numeric threshold that the level argument of any write method has to be equal to or larger than in order to the message being written. Thus, the lower the threshold is the more and more details will be outputted.</td>
</tr>
<tr>
<td>timestamp</td>
<td>If TRUE, each output is preceded with a timestamp.</td>
</tr>
<tr>
<td>removeFile</td>
<td>If TRUE and con is a filename, the file is first deleted, if it exists.</td>
</tr>
<tr>
<td>asGString</td>
<td>If TRUE, all messages are interpreted as GString before being output, otherwise not.</td>
</tr>
<tr>
<td>core</td>
<td>Internal use only.</td>
</tr>
<tr>
<td>...</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Fields and Methods

Methods:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>as.character</td>
<td>Returns a character string version of this object.</td>
</tr>
<tr>
<td>as.double</td>
<td>Gets a numeric value of this object.</td>
</tr>
<tr>
<td>as.logical</td>
<td>Gets a logical value of this object.</td>
</tr>
<tr>
<td>capture</td>
<td>Captures output of a function.</td>
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<td>Concatenates and prints objects if above threshold.</td>
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<td>timestamp</td>
<td>Writes a timestamp.</td>
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<td>timestampOff</td>
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<td>timestampOn</td>
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<td>Outputs any warnings recorded.</td>
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<td>writeRaw</td>
<td>Writes objects if above threshold.</td>
</tr>
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Methods inherited from Object:
$\$, $\leftarrow$, $\left[\right.$, $\left[\left[\left\langle\right.$, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstantiationTime, getStaticInstance, hasField, hashCode, ll, load, names, objectSize, print, save

Output levels

As a guideline, use the following levels when outputting verbose/debug message using the Verbose class. For a message to be shown, the output level must be greater than (not equal to) current threshold. Thus, the lower the threshold is set, the more messages will be seen.

- **<= -100** Only for debug messages, i.e. messages containing all necessary information for debugging purposes and to find bugs in the code. Normally these messages are so detailed so they will be a pain for the regular user, but very useful for bug reporting and bug tracking by the developer.
• -99 – -11 Detailed verbose messages. These will typically be useful for the user to understand what is going on and do some simple debugging fixing problems typically due to themselves and not due to bugs in the code.

• -10 – -1 Verbose messages. For example, these will typically report the name of the file to be read, the current step in a sequence of analysis steps and so on. These message are not very useful for debugging.

• 0 Default level in all output methods and default threshold. Thus, by default, messages at level 0 are not shown.

• >= +1 Message that are always outputted (if threshold is kept at 0). We recommend not to output message at this level, because methods should be quiet by default (at the default threshold 0).

A compatibility trick and a speed-up trick

If you want to include calls to Verbose in a package of yours in order to debug code, but not use it otherwise, you might not want to load R.utils all the time, but only for debugging. To achieve this, the value of a reference variable to a Verbose class is always set to \texttt{TRUE}, cf. typically an Object reference has value \texttt{NA}. This makes it possible to use the reference variable as a first test before calling Verbose methods. Example:

```r
define function(. . . , verbose=FALSE)

    # enter() will never be called if verbose==FALSE, thus no error.
    verbose \&\& enter(verbose, "Loading")

```

Thus, \texttt{R.utils} is not required for \texttt{foo()}, but for \texttt{foo(Verbose=Verbose(level=-1))} it is.

Moreover, if using the \texttt{NullVerbose} class for ignoring all verbose messages, the above trick will indeed speed up the code, because the value of a NullVerbose reference variable is always \texttt{FALSE}.

Extending the Verbose class

If extending this class, make sure to output messages via \texttt{\_writeRaw()} or one of the other output methods (which in turn all call the former). This guarantees that \texttt{\_writeRaw()} has full control of the output, e.g. this makes it possible to split output to standard output and to file.

Author(s)

Henrik Bengtsson

See Also

\texttt{NullVerbose}. 

Examples

verbose <- Verbose(threshold=-1)

header(verbose, "A verbose writer example", padding=0)

enter(verbose, "Analysis A")
for (kk in 1:10) {
  printf(verbose, "step %d\n", kk)
  if (kk == 2) {
    cat(verbose, "Turning ON automatic timestamps")
    timestampOn(verbose);
  } else if (kk == 4) {
    timestampOff(verbose);
    cat(verbose, "Turning OFF automatic timestamps")
    cat(verbose, "Turning OFF verbose messages for steps ", kk, "-6")
    off(verbose)
  } else if (kk == 6) {
    on(verbose)
    cat(verbose, "Turned on verbose messages just before step ", kk+1)
  }
  if (kk %% 5) {
    enterf(verbose, "Sub analysis %d", kk)
    for (jj in c("i", "ii", "iii")) {
      cat(verbose, "part ", jj)
    }
    exit(verbose)
  }
}
cat(verbose, "All steps completed!")
exit(verbose)

ruler(verbose)
cat(verbose, "Demo of some other methods:")
str(verbose, c(a=1, b=2, c=3))
print(verbose, c(a=1, b=2, c=3))
summary(verbose, c(a=1, b=2, c=3))
evaluate(verbose, rnorm(n=3, mean=2, sd=3))
ruler(verbose)
newline(verbose)

withCapture

<table>
<thead>
<tr>
<th>withCapture</th>
<th>Evaluates an expression and captures the code and/or the output</th>
</tr>
</thead>
</table>

Description

Evaluates an expression and captures the code and/or the output.
Usage

```r
withCapture(expr, replace=getOption("withCapture/substitute", ".x."), code=TRUE,
output=code, ..., max.deparse.length=getOption("max.deparse.length", 10000),
trim=TRUE, newline=getOption("withCapture/newline", TRUE), collapse="\n", substitute=replace,
envir=parent.frame())
```

Arguments

- **expr**: The R expression to be evaluated.
- **replace**: An optional named list used for substituting symbols with other strings.
- **code**: If TRUE, the deparsed code of the expression is echoed.
- **output**: If TRUE, the output of each evaluated subexpression is echoed.
- **max.deparse.length**: A positive integer specifying the maximum length of a deparsed expression, before truncating it.
- **trim**: If TRUE, the captured rows are trimmed.
- **newline**: If TRUE and collapse is non-NULL, a newline is appended at the end.
- **collapse**: A character string used for collapsing the captured rows. If NULL, the rows are not collapsed.
- **substitute**: (to be deprecated) use replace instead.
- **envir**: The environment in which the expression is evaluated.

Value

Returns a character string class 'CapturedEvaluation'.

Author(s)

Henrik Bengtsson

See Also

Internally, eval() is used to evaluate the expression.

Examples

```r
print(withCapture(
    n <- 3;
    n;
    for (kk in 1:3) {
        printf("Iteration #\%d\n", kk);
    }

print(Sys.time());
```
withLocale

```r
withLocale

```n

Description

Evaluate an R expression with locale set temporarily.

Usage

```r
withLocale(expr, category, locale, ..., substitute=TRUE, envir=parent.frame())
```
withOptions

Evaluate an R expression with options set temporarily

Description

Evaluate an R expression with options set temporarily.

Usage

withOptions(expr, ..., args=list(), substitute=TRUE, envir=parent.frame())
withOptions

Arguments
- **expr**: The R expression to be evaluated.
- **...**: Named options to be used.
- **args**: (optional) Additional named options specified as a named list.
- **substitute**: If `TRUE`, argument `expr` is `substitute()`ed, otherwise not.
- **envir**: The environment in which the expression should be evaluated.

Details
Upon exit (also on errors), this function will reset all options to the state of options available upon entry. This means any options modified but also those added when evaluating `expr` will also be undone upon exit.

Value
Returns the results of the expression evaluated.

Author(s)
Henrik Bengtsson

See Also
Internally, `eval()` is used to evaluate the expression. and `options()` to set options.

Examples
```r
print(pi)

# Same, i.e. using default
withOptions({
  print(pi)
})

# Printing with two digits
withOptions({
  print(pi)
}, digits=2)

# Printing with two digits then with three more
withOptions({
  print(pi)
  withOptions({
    print(pi)
  }, digits=getOption("digits")+3)
}, digits=2)

# Still printing with the default
print(pi)
```
withRepos

Evaluate an R expression with repositories set temporarily

Description

Evaluate an R expression with repositories set temporarily.

Usage

withRepos(expr, repos="[[mainstream]]", ..., substitute=TRUE, envir=parent.frame())

Arguments

- **expr**: The R expression to be evaluated.
- **repos**: A character vector of repositories to use.
- **...**: Additional arguments passed to useRepos().
- **substitute**: If TRUE, argument expr is substitute():ed, otherwise not.
- **envir**: The environment in which the expression should be evaluated.

Value

Returns the results of the expression evaluated.

Author(s)

Henrik Bengtsson

See Also

 Internally, eval() is used to evaluate the expression. See also options() and install.packages.

Examples

```r
## Not run:
# Install from BioC related repositories only
withRepos(install.packages("edgeR"), repos="[[BioC]]")

# Install from CRAN or BioC related repositories only
withRepos(install.packages("edgeR"), repos=c("CRAN", "[[BioC]]"))

# Install from mainstream repositories only (same as previous)
withRepos(install.packages("edgeR"), repos="[[mainstream]]")

# Install from R-Forge and mainstream repositories only
withRepos(install.packages("R.utils"), repos="[[R-Forge]]")

# Update only CRAN packages
withRepos(update.packages(ask=FALSE), repos="[[CRAN]]")
```
# Update only Bioconductor packages
withRepo(update.packages(ask=FALSE), repos="[[BioC]]")

## End(Not run)

---

**withSeed**  
*Evaluate an R expression with a temporarily set random set*

**Description**  
Evaluate an R expression with a temporarily set random set.

**Usage**  
`withSeed(expr, seed, ..., substitute=TRUE, envir=parent.frame())`

**Arguments**  
- `expr`: The R expression to be evaluated.
- `seed, ...`: Arguments passed to `set.seed()`.
- `substitute`: If `TRUE`, argument `expr` is `substitute()`ed, otherwise not.
- `envir`: The environment in which the expression should be evaluated.

**Details**  
Upon exit (also on errors), this function will restore `.Random.seed` in the global environment to the value it had upon entry. If it did not exist, it will be removed.

**Value**  
Returns the results of the expression evaluated.

**Author(s)**  
Henrik Bengtsson

**See Also**  
Internally, `set.seed()` is used to set the random seed.
Examples

```r
# Generate a random number
y0 <- runif(1)
print(y0)

# Generate a random number using the same seed over and over
yp <- NULL
for (ii in 1:10) {
  y <- withSeed({
    runif(1)
  }, seed=0x42)
  print(y)
  # Assert identical
  if (!is.null(yp)) stopifnot(identical(y, yp))
  yp <- y
}

# Generate a random number
y <- runif(1)
print(y)
```

withSink

Evaluate an R expression while temporarily diverting output.

Description

Evaluate an R expression while temporarily diverting output.

Usage

```r
withSink(expr, file, append=FALSE, type=c("output", "message"), substitute=TRUE, envir=parent.frame())
```

Arguments

- `expr` The R expression to be evaluated.
- `file` A writable connection or a character string naming the file to write to.
- `append` If TRUE, the diverted output is appended to the file, otherwise not.
- `type` A character string specifying whether to divert output sent to the standard output or the standard error. See sink() for details.
- `substitute` If TRUE, argument expr is substitute(ed, otherwise not.
- `envir` The environment in which the expression should be evaluated.

Details

Upon exit (also on errors), this function will close the requested "sink". If additional sinks (of any type) where also opened during the evaluation, those will also be closed with a warning.
Value

Returns the results of the expression evaluated.

Author(s)

Henrik Bengtsson

See Also

Internally, \texttt{sink()} is used to divert any output.

Examples

\begin{verbatim}
# Divert standard output
pathname <- tempfile(fileext=".output.txt")
res <- withSink(file=pathname, {
    print(letters)
})
mcat(readLines(pathname), sep="\n")

# Divert standard error/messages
pathname <- tempfile(fileext=".message.txt")
res <- withSink(file=pathname, type="message", {
    mprint(LETTERS)
})
mcat(readLines(pathname), sep="\n")
\end{verbatim}
timeout, cpu, elapsed

A numeric specifying the maximum number of seconds the expression is allowed to run before being interrupted by the timeout. The cpu and elapsed arguments can be used to specify whether time should be measured in CPU time or in wall time.

onTimeout

A character specifying what action to take if a timeout event occurs.

Details

This method utilizes `setTimeLimit()` by first setting the timeout limits, then evaluating the expression that may or may not timeout. The method is guaranteed to reset the timeout limits to be infinitely long upon exiting, regardless whether it returns normally or preemptively due to a timeout or an error.

Value

Returns the results of the expression evaluated. If timed out, `NULL` is returned if `onTimeout` was "warning" or "silent". If "error" a `TimeoutException` is thrown.

Non-supported cases

In order to understand when this function works and when it does not, it is useful to know that it utilizes R’s built-in time-out mechanism, which sets the limits on what is possible and not. From `setTimeLimit()`, we learn that:

"Time limits are checked whenever a user interrupt could occur. This will happen frequently in R code and during `Sys.sleep(*)`, but only at points in compiled C and Fortran code identified by the code author."

More precisely, if a function is implemented in native code (e.g. C) and the developer of that function does not check for user interrupts, then you cannot interrupt that function neither via a user interrupt (e.g. Ctrl-C) nor via the built-in time-out mechanism. To change this, you need to contact the developer of that piece of code and ask them to check for R user interrupts in their native code.

Furthermore, it is not possible to interrupt/break out of a "readline" prompt (e.g. `readline()` and `readLines()`) using timeouts; the timeout exception will not be thrown until after the user completes the prompt (i.e. after pressing ENTER).

System calls via `system()` and `system2()` cannot be timed out via the above mechanisms. However, in R (>= 3.5.0) these functions have argument `timeout` providing their own independent timeout mechanism.

Other examples of calls that do not support timeout are "atomic" calls that may take very long such as large object allocation and `rnorm(n)` where n is very large.

(*) Note that on Unix and macOS, `Sys.sleep(time)` will signal a timeout error only after time seconds passed, regardless of timeout limit (< time).

Author(s)

Henrik Bengtsson
withTimeout

References

[1] R help thread 'Time out for a R Function' on 2010-12-06. http://www.mail-archive.com/r-help@r-project.org/msg119344.html

See Also

Internally, eval() is used to evaluate the expression and setLimit() is used to control for timeout events.

Examples

# Function that takes "a long" time to run
foo <- function() {
  print("Tic")
  for (kk in 1:100) {
    print(kk)
    Sys.sleep(0.1)
  }
  print("Tac")
}

# Evaluate code, if it takes too long, generate a timeout by throwing a TimeoutException.
res <- NULL
tryCatch({
  res <- withTimeout({
    foo()
  }, timeout = 1.08)
}, TimeoutException = function(ex) {
  message("Timeout. Skipping.")
})

# Evaluate code, if it takes too long, generate a timeout returning NULL and generate a warning.
res <- withTimeout({
  foo()
}, timeout = 1.08, onTimeout = "warning")

# The same using an expression object
expr <- quote(foo())
res <- withTimeout(expr, substitute = FALSE,
                   timeout = 1.08, onTimeout = "warning")
# - - - - - - - - - - - - - - - - - - - - - - - -
# Evaluate code, if it takes too long, generate
# a timeout, and return silently NULL.
# - - - - - - - - - - - - - - - - - - - - - - - -
res <- withTimeout({
  foo()
}, timeout = 1.08, onTimeout = "silent")

---

**wrap.array**

**Reshape an array or a matrix by permuting and/or joining dimensions**

**Description**

Reshape an array or a matrix by permuting and/or joining dimensions.

A useful application of this is to reshape a multidimensional array to a matrix, which then can be saved to file using for instance write.table().

**Usage**

```r
## S3 method for class 'array'
wrap(x, map=list(NA), sep=".", ...)
```

**Arguments**

- **x**
  - An array or a matrix.

- **map**
  - A list of length equal to the number of dimensions in the reshaped array. Each element should be an integer vector specifying the dimensions to be joined in corresponding new dimension. One element may equal NA to indicate that that dimension should be a join of all non-specified (remaining) dimensions. Default is to wrap everything into a vector.

- **sep**
  - A character pasting joined dimension names.

- **...**
  - Not used.

**Details**

If the indices in unlist(map) is in a non-increasing order, aperm() will be called, which requires reshuffling of array elements in memory. In all other cases, the reshaping of the array does not require this, but only fast modifications of attributes dim and dimnames.

**Value**

Returns an array of length(map) dimensions, where the first dimension is of size prod(map[[1]]), the second prod(map[[2]]), and so on.
Author(s)
Henrik Bengtsson

See Also
unwrap(). See aperm().

Examples

```r
# Create a 3x2x3 array
dim <- c(3,2,3)
ndim <- length(dim)
dimnames <- list()
for (kk in 1:ndim)
  dimnames[[kk]] <- sprintf("%s", letters[kk], 1:dim[kk])
x <- 1:prod(dim)
x <- array(x, dim=dim, dimnames=dimnames)
cat("Array 'x':\n")
print(x)

cat("\nReshape 'x' to its identity:"
)
y <- wrap(x, map=list(1, 2, 3))
print(y)
# Assert correctness of reshaping
stopifnot(identical(y, x))

cat("\nReshape 'x' by swapping dimensions 2 and 3, i.e. aperm(x, perm=c(1,3,2)):"
)
y <- wrap(x, map=list(1, 3, 2))
print(y)
# Assert correctness of reshaping
stopifnot(identical(y, aperm(x, perm=c(1,3,2))))

cat("\nWrap 'x' to a matrix 'y' by keeping dimension 1 and joining the others:"
)
y <- wrap(x, map=list(1, NA))
print(y)
# Assert correctness of reshaping
for (aa in dimnames(x)[[1]]) {
  for (bb in dimnames(x)[[2]]) {
    for (cc in dimnames(x)[[3]]) {
      tt <- paste(bb, cc, sep="."")
      stopifnot(identical(y[aa,tt], x[aa,bb,cc]))
    }
  }
}
```

cat("\nUnwrap matrix 'y' back to array 'x':\n")
z <- unwrap(y)
print(z)
stopifnot(identical(z,x))

cat("\nWrap a matrix 'y' to a vector and back again:\n")
x <- matrix(1:8, nrow=2, dimnames=list(letters[1:2], 1:4))
y <- wrap(x)
z <- unwrap(y)
print(z)
stopifnot(identical(z,x))

cat("\nWrap and unwrap a randomly sized and shaped array 'x2':\n")
maxdim <- 5
dim <- sample(1:maxdim, size=sample(2:maxdim))
ndim <- length(dim)
dimnames <- list()
for (kk in 1:ndim)
  dimnames[[kk]] <- sprintf("%s%d", letters[kk], 1:dim[kk])
x2 <- 1:prod(dim)
x2 <- array(x, dim=dim, dimnames=dimnames)

cat("\nArray 'x2':\n")
print(x)

# Number of dimensions of wrapped array
ndim2 <- sample(1:(ndim-1), size=1)

# Create a random map for joining dimensions
splits <- NULL;
if (ndim > 2)
splits <- sort(sample(2:(ndim-1), size=ndim2-1))
splits <- c(0, splits, ndim);
map <- list();
for (kk in 1:ndim2)
  map[[kk]] <- (splits[kk]+1):splits[kk+1];

cat("\nRandom 'map':\n")
print(map)

cat("\nArray 'y2':\n")
y2 <- wrap(x2, map=map)
print(y2)

cat("\nArray 'x2':\n")
z2 <- unwrap(y2)
print(z2)

stopifnot(identical(z2,x2))
### Description

Writes binary data to disjoint sections of a connection or a file.

### Usage

```r
## Default S3 method:
writeBinFragments(con, object, idxs, size=NA, ...)
```

### Arguments

- **con**  
  A `connection` or the pathname of an existing file.
- **object**  
  A `vector` of objects to be written.
- **idxs**  
  A `vector` of (non-duplicated) indices or a Nx2 `matrix` of N from-to index intervals specifying the elements to be read. Positions are always relative to the start of the file/connection.
- **size**  
  The size of the data type to be read. If `NA`, the natural size of the data type is used.
- **...**  
  Additional arguments passed to `writeBin()`.

### Value

Returns nothing.

### Author(s)

Henrik Bengtsson

### See Also

- `readBinFragments()`.

### Examples

```r
## Not run: # See example(readBinFragments.connection)
```
writeDataframe.data.frame

*Writes a data.frame to tabular text file*

**Description**

Writes a data.frame to tabular text file with an optional header.

**Usage**

```r
## S3 method for class 'data.frame'
writedataframe(data, file, path=NULL, sep="\t", quote=FALSE, row.names=FALSE, col.names=!append, ..., header=list(), createdBy=NULL, createdAt=format(Sys.time(), format = "%Y-%m-%d %H:%M:%S %z"), nrowOfRows=nrow(data), headerPrefix="# ", headerSep=": ", append=FALSE, overwrite=FALSE)
```

**Arguments**

- `data`  
  A `data.frame`.

- `file`  
  A `connection` or a filename to write to.

- `path`  
  The directory where the file will be written.

- `sep`, `quote`, `row.names`, `col.names`, ...
  Additional arguments passed to `write.table`.

- `header`  
  An optional named `list` of header rows to be written at the beginning of the file. If `NULL`, no header will be written.

- `createdBy`, `createdAt`, `nrowOfRows`  
  If non-`NULL`, common header rows to be added to the header.

- `headerPrefix`  
  A `character` string specifying the prefix of each header row.

- `headerSep`  
  A `character` string specifying the character separating the header name and header values.

- `append`  
  If `TRUE`, the output is appended to an existing file.

- `overwrite`  
  If `TRUE`, an existing file is overwritten.

**Value**

Returns (invisibly) the pathname to the file written (or the `connection` written to).

**Author(s)**

Henrik Bengtsson

**See Also**

`write.table`, `readTable`.
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