Package ‘R.oo’

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Description Methods and classes for object-oriented programming in R with or without references. Large effort has been made on making definition of methods as simple as possible with a minimum of maintenance for package developers. The package has been developed since 2001 and is now considered very stable. This is a cross-platform package implemented in pure R that defines standard S3 classes without any tricks.
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### Description

Methods and classes for object-oriented programming in R with or without references. Large effort has been made on making definition of methods as simple as possible with a minimum of maintenance for package developers. The package has been developed since 2001 and is now considered very stable. This is a cross-platform package implemented in pure R that defines standard S3 classes without any tricks.

Please note that the Rdoc syntax/grammar used to convert Rdoc comments in code into Rd files is not strictly defined and is modified by the need of the author. Ideally, there will be a well defined Rdoc language one day.

### Installation and updates

To install this package do

```
install.packages("R.oo")
```

### Dependencies and other requirements

This package requires a standard R installation and the `R.methodsS3` package.

### To get started

To get started, it is very useful to understand that:

1. The `setMethodS3()` function, which is defined in the `R.methodsS3` package (used to be part of `R.oo`), is nothing but a convenience wrapper for setting up S3 methods, and automatically create an S3 generic function, if missing. For more information, see the help of `R.methodsS3`.

2. The `Object` class is a top-level "root" class that provides support for reference variables. Any class inheriting from this class supports reference variables.
R.oo-package

3. The Object class is basically a wrapper around an environment, which some additional accessors etc. It is the environment data type that provides the "emulation" of reference variables - the Object class structure makes it easier to extends this class and adds some level of coding protection. The Object class features is not intended for referencing individual elements of basic R data types, but rather for the whole variable of such. For instance, you can reassign a whole matrix X part of the object this way, but you cannot reassign X[1,1] without creating a completely new copy.

Further readings

For a detailed introduction to the package see [1] (part of the package distribution).

How to cite this package

Whenever using this package, please cite [1] as


License

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

Author(s)

Henrik Bengtsson

References


See Also

People interested in R.oo may also be interested in packages proto and mutatr.
Class

The Class class describes an Object class

Description

Package: R.oo
Class Class

Object
~~|~~
~~+-Class

Directly known subclasses:

public static class Class
extends Object

The Class class describes an Object class. First of all, this class is most commonly used internally and neither the end user nor the programmer need to know about the class Class.

Usage

Class(name=NULL, constructor=NULL)

Arguments

name Name of the class.
constructor Constructor (function) of any Object class.

Details

The class Class describes the Object class or one of its subclasses. All classes and constructors created by setConstructorS3() will be of class Class. Its methods provide ways of accessing static fields and static methods. Its print() method will print detailed information about the class and its fields and methods.

Fields and Methods

Methods:

$ -
$<- -
.DollarNames -
.subset2Internal -
Exception

[[
[<-
argsToString Gets the arguments of a function as a character string.
as.character Returns a short string describing the class.
forName Gets a Class object by a name of a class.
getDetails Lists the fields and methods of a class.
getFields Returns the field names of a class.
getKnownSubclasses Gets all subclasses that are currently loaded.
getMethods Returns the method names of class and its super classes.
getName Gets the name of the class.
getPackage Gets the package to which the class belongs.
getRdDeclaration Gets the class declaration in Rd format.
getRdHierarchy Gets the class hierarchy in Rd format.
getRdMethods Gets the methods of a class in Rd format.
getStaticInstance Gets the static instance of this class.
getSuperclasses Gets the super classes of this class.
isAbstract Checks if a class is abstract or not.
isBeingCreated Checks if a class is currently being initiated.
isDeprecated Checks if a class is deprecated or not.
isPrivate Checks if a class is defined private or not.
isProtected Checks if a class is defined protected or not.
isPublic Checks if a class is defined public or not.
isStatic Checks if a class is static or not.
newInstance Creates a new instance of this class.
print Prints detailed information about the class and its fields and methods.

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

---

Exception The Exception class to be thrown and caught

---

Description

Package: R.oo

Class Exception

Object

```r
```
Exception

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

**Directly known subclasses:**
*InternalErrorException, RecViolationException, RdocException*

public static class **Exception**
extends simpleError

Creates an Exception that can be thrown and caught. The Exception class is the root class of all other Exception classes.

**Usage**

```java
Exception(..., sep="", collapse="", )
```

**Arguments**

- ... One or several strings, which will be concatenated and contain informative message about the exception.
- sep The string to used for concatenating several strings.
- collapse The string to used collapse vectors together.

**Fields and Methods**

**Methods:**

- `as.character` Gets a character string representing of the Exception.
- `getCall` -
- `getCalls` Gets the active calls saved when the exception was created.
- `getMessage` Gets the message of the Exception.
- `getStackTrace` Gets the stack trace saved when the exception was created.
- `getStackTraceString` Gets the stack trace as a string.
- `getWhen` Gets the time when the Exception was created.
- `print` Prints the Exception.
- `printStackTrace` Prints the stack trace saved when the exception was created.
- `throw` Throws an Exception that can be caught.
Methods inherited from error:
  as.character, throw

Methods inherited from condition:
  abort, as.character, conditionCall, conditionMessage, print

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

Author(s)
  Henrik Bengtsson

See Also
  See also tryCatch() (and try()).

Examples

# 1. To catch a regular "error" exception thrown by e.g. stop().
tryCatch({
  x <- NA
  y <- NA
  tryCatch({
    x <- log(123)
    y <- log("a")
  }, error = function(ex) {
    print(ex)
  })
}, error = function(ex) {
  print(ex)
})
print(x)
print(y)

# 2. Always run a "final" expression regardless or error or not.
tryCatch({
  filename <- tempfile("R.methodsS3.example")
  con <- file(filename)
  tryCatch({
    open(con, "r")
  }, error = function(ex) {
    cat("Could not open ", filename, " for reading.\n", sep="")
  }, finally = {
    close(con)
    cat("The id of the connection is ",
    ifelse(is.null(con), "NULL", con), ".\n", sep="")
  })
})
### # 3. Creating your own Exception class

```r
dataConstructorS3("NegativeLogValueException", function(
    msg="Trying to calculate the logarithm of a negative value", value=NULL) {
    extend(Exception(msg=msg), "NegativeLogValueException",
    .value = value
  )
})

setMethodS3("as.character", "NegativeLogValueException", function(this, ...) {
    paste(as.character.Exception(this), ": ", getValue(this), sep="\""
  )
})

setMethodS3("getValue", "NegativeLogValueException", function(this, ...) {
    this$.value
  )
})

mylog <- function(x, base=exp(1)) {
  if (x < 0)
    throw(NegativeLogValueException(value=x))
  else
    log(x, base=base)
}

# Note that the order of the catch list is important:
l <- NA
x <- 123
tryCatch({
  l <- mylog(x)
}, NegativeLogValueException = function(ex) {
  cat(as.character(ex), ":\n"
}, "try-error" = function(ex) {
  cat("try-error: Could not calculate the logarithm of ", x, ".\n", sep="\"
}, error = function(ex) {
  cat("error: Could not calculate the logarithm of ", x, ".\n", sep="\"
})
  cat("The logarithm of ", x, ", is ", l, ".\n\n", sep="\""
}
```

---

`extend` _Extends an object_

**Description**

via a mechanism known as "parasitic inheritance". Simply speaking this method "extends" the class of an object. What is actually happening is that it creates an instance of class name ...className,
by taking another object and add ...className to the class list and also add all the named values in ... as attributes.

The method should be used by the constructor of a class and nowhere else.

Usage

```r
## Default S3 method:
extend(this, ...className, ...)
```

Arguments

class

- `this`: Object to be extended.
- `...className`: The name of new class.
- `...`: Attribute fields of the new class.

Value

Returns an object of class ...className.

Author(s)

Henrik Bengtsson

Examples

```r
setConstructorS3("MyDouble", function(value=0, ...) {
  extend(as.double(value), "MyDouble", ...)
})

setMethodS3("as.character", "MyDouble", function(object, ...) {
  fmtstr <- attr(object, "fmtstr")
  if (is.null(fmtstr))
    fmtstr <- "%.6f"
  sprintf(fmtstr, object)
})

setMethodS3("print", "MyDouble", function(object, ...) {
  print(as.character(object), ...)
})

x <- MyDouble(3.1415926)
print(x)

x <- MyDouble(3.1415926, fmtstr="%3.2f")
print(x)
attr(x, "fmtstr") <- "%e"
print(x)
```
getConstructorS3

Get a constructor method

Description

Get a constructor method.

Usage

## Default S3 method:
getConstructorS3(name, ...)

Arguments

name The name of the constructor function.

... Not used.

Author(s)

Henrik Bengtsson
getName.environment

Gets the name of an environment

Description

Gets the name of an environment, e.g. "R_GlobalEnv" or "0x01ddd060".

Usage

## S3 method for class 'environment'
getName(env, ...)

Arguments

- env: An environment.
- ...: Not used.

Value

Returns a character string.

Author(s)

Henrik Bengtsson

See Also

environmentName().

Examples

name <- getName(globalenv())
print(name)
stopifnot(identical(name, "R_GlobalEnv"))

getName(new.env())
InternalErrorException

InternalErrorException represents internal errors

Description

Package: R.oo

Class InternalErrorException

Object
   |~|~~--try-error
   |~~~~~~~~~|~
   |~~~~~~~~~~|---condition
   |~~~~~~~~~~|   |~
   |~~~~~~~~~~~|---error
   |~~~~~~~~~~~|   |~
   |~~~~~~~~~~~~~~~~~~|---simpleError
   |~~~~~~~~~~~~~~~~~~|   |~
   |~~~~~~~~~~~~~~~~~~~|---Exception
   |~~~~~~~~~~~~~~~~~~~|   |~
   |~~~~~~~~~~~~~~~~~~~|---InternalErrorException

Directly known subclasses:

public static class InternalErrorException
extends Exception

InternalErrorException represents internal errors that are likely to be due to implementation errors done by the author of a specific package and not because the user made an error. Errors that are due to unexpected input to functions etc falls under this error type.

Usage

InternalErrorException(..., package=NULL)

Arguments

... Any arguments accepted by Exception
.

package The name (character string) of the package where the error exists. Can also be a Package object. If NULL, the source of the error is assumed to be unknown.
Fields and Methods

Methods:

- `getMessage` Gets the message of the exception.
- `getPackage` Gets the suspicious package likely to contain an error.

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.

---

Generates a list of informative properties of all members of an environment

Description

Generates a list of informative properties of all members of an environment.

Usage

```r
## Default S3 method:
ll(pattern=".*", \ ..., private=FALSE, properties=getOption("R.oo::ll/properties",
c("data.class", "dimension", "objectSize")), sortBy=NULL, decreasing=FALSE, envir=parent.frame())
```
Arguments

- **pattern**: Regular expression pattern specifying which members to return. If ".\.*", all names are matched.
- **...**: A named vector of format functionName=value, where functionName() will be called on each member found. If the result matches the value, the member is returned, otherwise not.
- **private**: If TRUE, also private members, i.e. members with a name starting with a . (period), will be listed, otherwise not.
- **properties**: Names of properties to be returned. There must exist a function with the same name, because it will be called. This way one can extract any type of property by defining new methods.
- **sortBy**: Name or index of column (property) to be sorted by. If NULL, the objects are listed in the order they are found.
- **decreasing**: A logical indicating whether the sorting should be done in increasing or decreasing order.
- **envir**: An environment, a search path index or a name of a package to be scanned.

Value

Returns a data.frame containing information about all the members.

Default properties returned

It is possible to set the default value of argument properties by setting option "R.oo::ll/properties", e.g. options("R.oo::ll/properties"=c("data.class", "dimension")). If this option is not set when the package is loaded, it is set to c("data.class", "dimension", "objectSize").

Author(s)

Henrik Bengtsson

See Also

ls.str and ll.Object().

Examples

```r
## Not run:
To list all objects in .GlobalEnv:
> ll()

   member data.class dimension objectSize
   1  *tmp*    Person      1       428
   2  as.character.Person function NULL    1208
   3     country    character      1       44
   4  equals.Person function NULL    2324
   5     filename  character      1       84
   6     getAge    function NULL     372
   7 getAge.Person function NULL     612
```
Object

The root class that every class must inherit from

Description

R.oo

Class Object

public class Object

Object is the root class of all other classes. All classes must extends this class, directly or indirectly, which means that they all will inherit the methods in this class.

Usage

Object(core=NA, finalize=TRUE)

Arguments

core

The core value of each reference referring to the Object. By default, this is just the smallest possible R object, but there are situations where it is useful to have another kind of core, which is the case with the Class class. Note that this value belongs to the reference variable and not to the Object, which means it can not be referenced.

finalize

If TRUE, method *finalize() will be called on this Object when it is garbage collected.
Fields and Methods

Methods:

$ 
$<- 
.DollarNames 
.subset2Internal 
[ 
[<- 
.as.character Gets a character string representing the object.
attach Attaches an Object to the R search path.
attachLocally Attaches an Object locally to an environment.
clearCache Clear fields that are defined to have cached values.
clearLookupCache Clear internal fields used for faster lookup.
clone Clones an Object.
detach Detach an Object from the R search path.
equals Compares an object with another.
extend Extends another class.
finalize Finalizer methods called when object is clean out.
getEnvironment Gets the environment of this object.
getFieldModifier -
getFieldModifiers Gets all types of field modifiers.
getFields Returns the field names of an Object.
getInstantiationTime Gets the time when the object was instantiated.
getInternalAddress Gets the memory location where the Object resides.
getStaticInstance Gets the static instance of this objects class.
hasField Checks if a field exists or not.
hashCode Gets a hash code for the Object.
isReferable Checks if the object is referable or not.
ll Generates a list of informative properties of all members of an Object.
load Static method to load an Object from a file or a connection.
names -
nnewInstance Creates a new instance of the same class as this object.
novirtual Returns a reference to the same Object with virtual fields turned off.
objectSize Gets the size of the Object in bytes.
print Prints an Object.
save Saves an Object to a file or a connection.
staticCode Method that will be call each time a new instance of a class is created.

Defining static fields

To define a static field of an Object class, use a private field <.field> and then create a virtual field <field> by defining methods get<Field>() and set<Field>(). These methods should retrieve and assign the value of the field <.field> of the static instance of the class. The second example below shows how to do this. The example modifies also the static field already in the constructor, which is something that otherwise may be tricky.
Author(s)

Henrik Bengtsson

References


Examples

#########################################################################
# Defines the class Person with private fields .name and .age, and
# with methods print(), getName(), setName(), getAge() and setAge().
#########################################################################
setConstructorS3("Person", function(name, age) {
  if (missing(name)) name <- NA
  if (missing(age)) age <- NA

  extend(Object(), "Person",
  .name=name,
  .age=age
  )
})

setMethodS3("as.character", "Person", function(this, ...) {
  paste(this$.name, "is", as.integer(this$.age), "years old.")
})

setMethodS3("equals", "Person", function(this, obj, ...) {
  ( identical(data.class(this), data.class(obj)) &&
    identical(this$getName(), obj$getName()) &&
    identical(this$getAge(), obj$getAge()) )
})

setMethodS3("hashCode", "Person", function(this, ...) {
  # Get the hashCode() of the ".name" and the ".age" fields
  # using hashCode.default().
  hashCode(this$.name) * hashCode(this$.age)
})

setMethodS3("getName", "Person", function(this, ...) {
  this$.name
})

setMethodS3("setName", "Person", function(this, newName, ...) {
  throw("It is not possible to change the name of a Person.")
})
Object

```javascript
setMethodS3("getAge", "Person", function(this, ...) {
    return this$.age
});

setMethodS3("setAge", "Person", function(this, newAge, ...) {
    if (!is.numeric(newAge))
        throw("Age must be numeric: ", newAge)
    if (newAge < 0)
        throw("Trying to set a negative age: ", newAge)
    this$.age <- newAge
});
```

*******************************************************************************
# Code demonstrating different properties of the Object class using
# the example class Person.
*******************************************************************************

# Create an object (instance of) the class Person.
p1 <- Person("Dalai Lama", 67)

# 'p1' is an Object of class Person.
print(data.class(p1))  # "Person"

# Prints information about the Person object.
print(p1)  # "Dalai Lama is 67 years old."

# or equivalent (except that no generic method has to exist):
p1$print()  # "Dalai Lama is 67 years old."

# Shows that no generic method is required if the $ operator is used:
print(p1$getName())  # "Dalai Lama"

# The following will call p1$getName() since there exists a get()-
# method for the 'name' property.
print(p1$name)  # "Dalai Lama"

# and equivalent when using the [[ operator.
print(p1[["name"]])  # "Dalai Lama"

# The following shows that p1$setName(68) is called, simply because
# there exists a set()- method for the 'name' property.
p1$age <- 68  # Will call p1$setAge(68)

# Shows that the age of the Person has been updated:
print(p1)  # "Dalai Lama is 68 years old."

# If there would not exists such a set()- method or field a new
# field would be created:
pl$country <- "Tibet"

# Lists all (non-private) members of the Person object:
print(ll(p1))

# which gives
# member class mode typeof length dim bytes
# 1 country NULL character character 1 NULL 44

# The following will call pl$setName("Lalai Dama") which will
# throw an exception saying one can not change the name of
# a Person.
tryCatch(p1$name <- "Lalai Dama", error=print)

# The following will call pl$setAge(-4) which will throw an
# exception saying that the age must be a non-negative number.
tryCatch(p1$age <- -100, error=print)

# Attaches Object 'pl' to the search path.
attach(p1)

# Accesses the newly created field 'country'.
print(country) # "Tibet"

# Detaches Object 'pl' from the search path. Note that all
# modifications to 'country' are lost.
country <- "Sweden"
detach(p1)
print(p1$country) # "Tibet"

# Saves the Person object to a temporary file.
filename <- tempfile("R.methodsS3.example")
save(p1, filename)

# Deletes the object
rm(p1)

# Loads an Object (of "unknown" class) from file using the
# static method load() of class Object.
obj <- Object$load(filename)

# Prints information about the new Object.
print(obj)

# Lists all (non-private) members of the new Object.
print(ll(obj))

########################################################################
# Example illustrating how to "emulate" static fields using virtual
# fields, i.e. get- and set-methods. Here we use a private static
# field `.count' of the static class instance 'MyClass', i.e. `MyClass$.count'. Then we define a virtual field 'count' via method `getCount()' to access this static field. This will make all queries for 'count' of any object to use the static field instead. In the same way is assignment controlled via the `setCount()' method. A side effect of this way of coding is that all MyClass instances will also have the private field '.count' (set to zero except for the static field that is).

```r
setConstructorS3("MyClass", function(...) {
  # Create an instance (the static class instance included)
  this <- extend(Object(), "MyClass",
    .count = 0
  )

  # In order for a static field to be updated in the constructor it has to be done after extend().
  this$\$count <- this$\$count + 1

  # Return the object
  this
})
```

```r
setMethodS3("as.character", "MyClass", function(this, ...) {
  paste(class(this)[1], ": Number of instances: ", this$\$count, sep="\"")
})
```

# Get virtual field 'count', e.g. obj$\$count.
```r
setMethodS3("getCount", "MyClass", function(this, ...) {
  MyClass$.count
})
```

# Set virtual field 'count', e.g. obj$\$count <- value.
```r
setMethodS3("setCount", "MyClass", function(this, value, ...) {
  MyClass$.count <- value
})
```

# Create four instances of class 'MyClass'
```r
obj <- lapply(1:4, MyClass)
print(obj)
print(MyClass$\$count)
print(obj[[1]]$\$count)

stopifnot(obj[[1]]$\$count == length(obj))
stopifnot(MyClass$\$count == length(obj))
```
objectSize

Description

Gets the size of the object in bytes. This method is just a wrapper for `object.size`.

Usage

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

Arguments

```r
...
```

Arguments passed to `object.size`.

Value

Returns an `integer`.

Author(s)

Henrik Bengtsson

See Also

Internally `object.size`.

objectSize.environment

Description

Gets the size of an environment in bytes.

Usage

```r
## S3 method for class 'environment'
objectSize(envir, ...)
```

Arguments

```r
envir  An `environment()`.
...
```

Arguments passed to `ls()`.
Value
Returns an integer.

Author(s)
Henrik Bengtsson

See Also
Internally object.size is used.

---

Package

The Package class provides methods for accessing package information.

Description
Package: R.oo
Class Package

Object
|--
|--|--Package

Directly known subclasses:

public class Package
extends Object

Creates a Package that can be thrown and caught. The Package class is the root class of all other Package classes.

Usage
Package(name=NULL)

Arguments
name Name of the package.
Fields and Methods

Methods:

- `as.character`: Gets a string representation of this package.
- `getAuthor`: Gets the Author of this package.
- `getBundle`: Gets the Bundle that this package might belong to.
- `getBundlePackages`: Gets the names of the other packages that is in the same bundle as this package.
- `getChangeLog`: Gets the change log of this package.
- `getClasses`: Gets all classes of a package.
- `getContents`: Gets the contents of this package.
- `getContribUrl`: Gets the URL(s) from where this package can be installed.
- `getDataPath`: Gets the path to the data (data/) directory of this package.
- `getDate`: Gets the date when package was build.
- `getDescription`: Gets the description of the package.
- `getDescriptionFile`: Gets the description file of this package.
- `getDevelUrl`: Gets the URL(s) from where the developers version of this package can be installed.
- `getDocPath`: Gets the path to the accompanying documentation (doc/) directory of this package.
- `getEnvironment`: Gets the environment of a loaded package.
- `getExamplePath`: Gets the path to the example (R-ex/) directory of this package.
- `getHistory`: Gets the citation of this package.
- `getHowToCite`: Gets the citation of this package.
- `getLicense`: Gets the License of this package.
- `getMaintainer`: Gets the Maintainer of this package.
- `getName`: Gets the name of this package.
- `getNews`: Gets the name of this package.
- `getPath`: Gets the library (system) path to this package.
- `getPosition`: Gets the search path position of the package.
- `getTitle`: Gets the Title of this package.
- `getUrl`: Gets the URL of this package.
- `getVersion`: Gets the version of this package.
- `isLoaded`: Checks if the package is installed on the search path or not.
- `isOlderThan`: Checks if the package is older than a given version.
- `ll`: Generates a list of informative properties of all members of the package.
- `load`: Loads a package.
- `showChangeLog`: Show the change log of this package.
- `showContents`: Show the CONTENTS file of this package.
- `showDescriptionFile`: Show the DESCRIPTION file of this package.
- `showHistory`: Show the history of this package.
- `showHowToCite`: Show the HOWTOCITE file of this package.
- `showNews`: Show the news of this package.
- `startupMessage`: Generates a ’package successfully loaded’ package startup message.
- `unload`: Unloads a package.

Methods inherited from Object:

- S, $<-, [[, [[<-, as.character, attach, attachLocally, clearCache, clearLookupCache, clone, detach, equals, extend, finalize, getEnvironment, getFieldModifier, getFieldModifiers, getFields, getInstan-
Author(s)

Henrik Bengtsson

Examples

## Not run: # By defining .onAttach() as follows in zzz.R for a package, an
# instance of class Package with the same name as the package will
# be made available on the search path. More over, the code below
# will also inform the user that the package has been loaded:
#
# > library(R.oo)
# R.oo v0.52 (2003/04/13) was successfully loaded.
#
.onAttach <- function(libname, pkgname) {
  pkg <- Package(pkgname)
  assign(pkgname, pkg, pos=getPosition(pkg))
  cat(getName(pkg), " v", getVersion(pkg), " (", getDate(pkg), ",")
        " was successfully loaded.
", sep="
")
}

# The Package class works for any packages, loaded or not.

# Some information about the base package
pkg <- Package("base")
print(pkg)
# The official webpage is NA and the maintainer is R Core Team <R-core@
# r-project.org>. The package is installed in /usr/lib/R/library/base/.
# License: Part of R 3.6.2. Description: Base R functions. Type
# showNews(base) for package history, and ?base for help."
print(list.files(Package("base")$dataPath))

# Some information about the R.oo package
print(R.oo::R.oo)
# [1] "Package: R.oo v1.23.0-9000 . Title: R Object-Oriented Programming
# with or without References. The official webpage is https://github.com/
# HenrikBengtsson/R.oo and the maintainer is Henrik Bengtsson. The package
# is installed in /home/alice/R/x86_64-pc-linux-gnu-library/3.6/R.oo/.
# License: LGPL (>= 2.1). Description: Methods and classes for object-
# oriented programming in R with or without references. Large effort has
# been made on making definition of methods as simple as possible with a
# minimum of maintenance for package developers. The package has been
# developed since 2001 and is now considered very stable. This is a
# cross-platform package implemented in pure R that defines standard S3
# classes without any tricks. Type showNews(R.oo) for package history,
# and ?R.oo for help."

## End(Not run)
**Rdoc**

Class for converting Rdoc comments to Rd files

---

**Description**

Package: R.oo

**Class Rdoc**

Object

```
~~|
~~+--Rdoc
```

Directly known subclasses:

public static class Rdoc extends Object

Class for converting Rdoc comments to Rd files.

**Usage**

Rdoc()

**Fields and Methods**

**Methods:**

- `argsToString` Gets the arguments signature of a function.
- `check` Checks the compiled Rd files.
- `compile` Compile source code files containing Rdoc comments into Rd files.
- `createManPath` Creates the directory where the Rd files should be saved.
- `createName` Creates a class-method name.
- `declaration` Gets the class declaration.
- `escapeRdFilename` Escape non-valid characters in a filename.
- `getClassS4Usage` Gets the usage of a S4 class.
- `getKeywords` Gets the keywords defined in R with descriptions.
- `getManPath` Gets the path to the directory where the Rd files will be saved.
- `getNameFormat` Gets the current name format.
- `getObject` -
- `getPackageNameOf` Gets the package of a method or an object.
- `getRdTitle` Extracts the title string of a Rd file.
- `getUsage` Gets the usage of a method.
- `hierarchy` Gets the class hierarchy.
- `isKeyword` Checks if a word is a Rd keyword.
isVisible Checks if a member is visible given its modifiers.

methodsInheritedFrom Gets all methods inherited from a class in Rd format.

setManPath Sets the path to the directory where the Rd files should be saved.

setNameFormat Sets the current name format.

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

References


Examples

```r
## Not run: # Set default author
author <- "Henrik Bengtsson, \url{https://github.com/HenrikBengtsson/R.oo}"

# Show the file containing the Rdoc comments
rdocFile <- system.file("misc", "ASCII.R", package="R.oo")
file.show(rdocFile)

# Compile the Rdoc:s into Rd files (saved in the destPath directory)
destPath <- tempdir()
Rdoc$compile(rdocFile, destPath=destPath)

# List the generated Rd files
rdFiles <- list.files(destPath, full.names=TRUE)
print(rdFiles)

# Show one of the files
file.show(rdFiles[1])

# Clean up
file.remove(rdFiles)

## End(Not run)
```
RdocException

RdocException are thrown by the Rdoc compiler

Description

Package: R.oo
Class RdocException

Object

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

Directly known subclasses:

public static class RdocException
extends Exception

RdocException are thrown by the Rdoc compiler when it fails to generate a Rd file from an Rdoc comment.

Usage

RdocException(..., source=NULL)

Arguments

... Any arguments accepted by Exception
.
.
source Object specifying the source where the Rdoc error occurred. This is commonly a filename character string.
.
.
Fields and Methods

Methods:

  - as.character
  - getSource

  Gets a character string representing of the RdocException.
  Gets the source 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.

---

**setConstructorS3**  
*Defines a class in S3/UseMethod style*

---

**Description**

Defines a class in R.oo/S3 style. What this function currently does is simply creating a constructor function for the class.

**Usage**

```
## Default S3 method:
setConstructorS3(name, definition, private=FALSE, protected=FALSE, export=TRUE,
     static=FALSE, abstract=FALSE, trial=FALSE, deprecated=FALSE, envir=parent.frame(),
     enforceRCC=TRUE, ...)
```
setConstructorS3

Arguments

name
The name of the class.
definition
The constructor definition. Note: The constructor must be able to be called with no arguments, i.e. use default values for all arguments or make sure you use missing() or similar!
static
If TRUE this class is defined to be static, otherwise not. Currently this has no effect expect as an indicator.
abstract
If TRUE this class is defined to be abstract, otherwise not. Currently this has no effect expect as an indicator.
private
If TRUE this class is defined to be private.
protected
If TRUE this class is defined to be protected.
export
A logical setting attribute “export”.
trial
If TRUE this class is defined to be a trial class, otherwise not. A trial class is a class that is introduced to be tried out and it might be modified, replaced or even removed in a future release. Some people prefer to call trial versions, beta version. Currently this has no effect expect as an indicator.
deprecated
If TRUE this class is defined to be deprecated, otherwise not. Currently this has no effect expect as an indicator.
envir
The environment for where the class (constructor function) should be stored.
enforceRCC
If TRUE, only class names following the R Coding Convention is accepted. If the RCC is violated an RccViolationException is thrown.

Note: If a constructor is not declared to be private nor protected, it will be declared to be public.

A constructor must be callable without arguments

The requirement that a constructor function should be callable without arguments (e.g. MyConstructor()) is because that call is used to create the static instance of a class. The reason for this is that a static instance of the class is created automatically when the constructor is called the first time (only), that is, when the first of object of that class is created. All classes have to have a static instance.

To make a constructor callable without arguments, one can either make sure all arguments have default values or one can test for missing arguments using missing(). For instance the following definition is not correct: setConstructorS3("Foo", function(x) extend(Object(), "Foo", x=x)) whereas this one is setConstructorS3("Foo", function(x=NA) extend(Object(), "Foo", x=x))

Code validation

If argument enforceRCC is TRUE, the class name is validated so it starts with a letter and it also gives a warning if its first letter is not capital. The reason for this is to enforce a naming convention that names classes with upper-case initial letters and methods with lower-case initial letters (this is also the case in for instance Java).

Author(s)

Henrik Bengtsson
See Also

To define a method see `setMethodS3`. For information about the R Coding Conventions, see `RccViolationException`. For a thorough example of how to use this method see `Object`.

Examples

```r
## Not run: For a complete example see help(Object).
```

---

<table>
<thead>
<tr>
<th>throw</th>
<th>Throws an Exception</th>
</tr>
</thead>
</table>

Description

Throws an exception similar to `stop()`, but with support for `Exception` classes. The first argument (`object`) is by default pasted together with other arguments `...` and with separator `sep=""`. For instance, to throw an exception, write

```r
throw("Value out of range: ", value, ".")
```

which is short for

```r
throw(Exception("Value out of range: ", value, "."))
```

Note that `throw()` can be defined for classes inheriting `Exception`, which can then be caught (or not) using `tryCatch()`.

Usage

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

Arguments

`...` One or several strings that are concatenated and collapsed into one message string.

Value

Returns nothing.

Author(s)

Henrik Bengtsson

See Also

See the `Exception` class for more detailed information.
Examples

```r
rbern <- function(n=1, prob=1/2) {
    if (prob < 0 || prob > 1)
        throw("Argument 'prob' is out of range: ", prob)
    rbinom(n=n, size=1, prob=prob)
}

rbern(10, 0.4)
# [1] 0 1 0 0 0 1 0 0 1 0
tryCatch(rbern(10, 10*0.4),
    error=function(ex) {
    }
)
```

---

**throw.error**

Throw (rethrows) an object of class 'error'

Description

Rethrows an 'error' object. The 'error' class was introduced in R v1.8.1 with the new error handling mechanisms.

Usage

```r
## S3 method for class 'error'
throw(error, ...)
```

Arguments

- **error** An object or class 'error'.
- **...** Not used.

Value

Returns nothing.

Author(s)

Henrik Bengtsson

See Also

See the tryCatch() method etc. See the Exception class for more detailed information.
get <- function(n) if (n > 0) get(n - 1) + n else 0

result <- get(4)
print(result)
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