Package: ooplah (via r-universe)

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Title Helper Functions for Class Object-Oriented Programming

Version 0.2.0

Description Helper functions for coding object-oriented programming with a focus on R6. Includes functions for assertions and testing, looping, and re-usable design patterns including Abstract and Decorator classes.

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URL https://xoopR.github.io/ooplah/, https://github.com/xoopR/ooplah

BugReports https://github.com/xoopR/ooplah/issues

Imports R6

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Contents

`AbstractClass` *Create an abstract R6 Class*

Description

Creates an abstract R6 class by placing a thin wrapper around R6::R6Class which causes an error to be thrown if the class is directly constructed instead of one of its descendants.

Details

An abstract class is a class that cannot be constructed directly. Instead they are used to define common fields/methods for child classes that inherit from them.

All arguments of R6::R6Class can be used as usual, see full details at R6::R6Class.

References

Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1996). Design Patterns: Elements of Reusable Software. Addison-Wesley Professional Computing Series (p. 395).

Examples

```
library(R6)

ab <- AbstractClass("abstract", public = list(hello = "Hello World"))
## Not run:
# errors
ab$new()

## End(Not run)
child <- R6Class("child", inherit = ab)
child$new()$hello
```

`decorate` *Sugar function for decoration*

Description

Simple wrapper around `decorator$new(object, exists)`

Usage

```
decorate(object, decorators, exists = c("skip", "error", "overwrite"), ...)
```

Arguments

`object`	`[R6::R6Class]` R6 class to decorate.
`decorators`	`([DecorateClass]|character())` One or more decorators (by name or class) to decorate with.
`exists`	`(character(1)` Expected behaviour if method exists in `object` and `decorator`. One of: 1. `exists = "error"` (default) - This will throw an error and prevent the object being decorated. 2. `exists = "skip"` - This will decorate the object with all fields/methods that don't already exist. 3. `exists = "overwrite"` - This will decorate the object with all fields/methods from the decorator and overwrite ones with the same name if they already exist.
`...`	`ANY` Additional arguments passed to get.

See Also

DecoratorClass

Examples

```
library(R6)

## Define decorators
dec1 <- DecoratorClass("dec1", public = list(goodbye = "Goodbye World"))
dec2 <- DecoratorClass("dec2", public = list(goodbye2 = "Goodbye World 2"))

oop <- ooplah$new()
oop$goodbye
dec_oop <- decorate(oop, c(dec1, dec2))
dec_oop$goodbye
dec_oop$goodbye2

## Equivalently
oop <- ooplah$new()
decorate(oop, c("dec1", "dec2"))
```

`DecoratorClass` *Create an abstract R6 Class*

Description

Creates a decorator R6 class by placing a thin wrapper around R6::R6Class which allows the constructed class to inherit the fields and methods of the given object.

Details

The decorator design pattern allows methods to be added to an object without bloating the interface with too many methods on construction and without causing large inheritance trees. A decorator class contains fields/methods that are 'added' to the given object in construction, this is made clearer in examples.

There are three possibilities when trying to decorate an object with a field/method that already exists:

1. `exists = "skip"` (default) - This will decorate the object with all fields/methods that don't already exist
2. `exists = "error"` - This will throw an error and prevent the object being decorated
3. `exists = "overwrite"` - This will decorate the object with all fields/methods from the decorator and overwrite ones with the same name if they already exist

Decorators are currently not cloneable.

All arguments of R6::R6Class can be used as usual, see full details at R6::R6Class.

References

Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1996). Design Patterns: Elements of Reusable Software. Addison-Wesley Professional Computing Series (p. 395).

See Also

decorate

Examples

```
library(R6)

## Create two decorators
# Works with active bindings...
dec1 <- DecoratorClass("dec1", active = list(hi = function() "Hi World"))
# And public fields...
dec2 <- DecoratorClass("dec2", public = list(goodbye = "Goodbye World"))

## Create an object to decorate
oop <- ooplah$new()
oop$hello()
```

```
## Decorate with dec1 by constructing dec1 with object oop:
dec_oop <- dec1$new(oop) # equiv `decorate(oop, dec1)`
## We have all original methods from oop
dec_oop$hello()
# It's inherited methods
dec_oop$init
# And now decorated methods
dec_oop$hi

## We can decorate again
redec_oop <- dec2$new(dec_oop)
redec_oop$hello()
redec_oop$init
redec_oop$hi
# And now
redec_oop$goodbye

# Notice the class reflects all decorators, the original object and parents,
#  and adds the 'Decorator' class
class(redec_oop)

## Decorators also work with inheritance
parent_dec <- DecoratorClass("parent_dec",
  public = list(hi = function() "Hi!"))
child_dec <- DecoratorClass("child_dec", inherit = parent_dec)
dec_oop <- child_dec$new(ooplah$new())
dec_oop$hi()

## Three possibilities if the method/field name already exists:
oop <- ooplah$new()
exists_dec <- DecoratorClass("exists_dec",
  public = list(hello = function() "Hi!"))

# 1. skip (default)
oop$hello()
exists_dec$new(oop, exists = "skip")$hello()

# 2. error
## Not run:
exists_dec$new(oop)
exists_dec$new(oop, exists = "error")

## End(Not run)

# 3. overwrite
oop$hello()
exists_dec$new(oop, exists = "overwrite")$hello()

## Cloning
# Note that by default the decorated object is not cloned
dec <- DecoratorClass("dec", active = list(hi = function() "Hi World"))
```

```
dec_oop <- dec$new(oop)
dec_oop$logically
oop$logically <- FALSE
dec_oop$logically
```

`is.R6` *Is 'x' a R6 object or class?*

Description

Assert/test if 'x' is a R6 object or class

Usage

```
is.R6(x)

assert_R6(x)
```

Arguments

`x`	Object to test

Value

Either TRUE/FALSE is testing if `x` inherits from `R6` or `R6ClassGenerator`, otherwise returns `x` invisibly on assertion if TRUE or returns an error if FALSE

`is.R6Class` *Is 'x' a R6 class?*

Description

Assert/test if 'x' is a R6 class

Usage

```
is.R6Class(x)

assert_R6Class(x)
```

Arguments

`x`	Object to test

Value

Either TRUE/FALSE is testing if `x` inherits from `R6ClassGenerator`, otherwise returns `x` invisibly on assertion if TRUE or returns an error if FALSE

is.R6Object *Is 'x' a R6 object?*

Description

Assert/test if 'x' is a R6 object

Usage

```
is.R6Object(x)

assert_R6Object(x)
```

Arguments

x	Object to test

Value

Either TRUE/FALSE is testing if x inherits from R6, otherwise returns x invisibly on assertion if TRUE or returns an error if FALSE

loapply *Specialised lapply for objects*

Description

Specialised lapply functions for R6 or other OOP classes. This is simply a wrapper that detects if FUN is a function, in which case lapply is used as usual, or a string, in which case the given field/method is returned as a list.

Usage

```
loapply(X, FUN, ...)
```

Arguments

X, ...	See lapply
FUN	Either a function to apply to each element of X, as in lapply or the field/method name of an OOP object (see examples)

Examples

```
## lapply as usual
loapply(c(1, 2, 3), identity)

## For R6 objects
objs <- list(ooplah$new(), ooplah$new())
# Public field
loapply(objs, "oop")
# Public method
loapply(objs, "hello")
```

`object_class` *Get class of an object (possibly with inheritance)*

Description

Find class of an object or an ancestor of the object. In contrast to `class` which returns a class object and all its ancestors, this function returns either the class of the object itself, or the class of one of its ancestors.

Usage

```
object_class(object, ancestor = 0)

get_object_class(object, ancestor = 0, ...)

object_classes(..., objects = list(...))
```

Arguments

`object`	`ANY` Object to get the class of
`ancestor`	`(integer(1))` If greater than 0 then the given ancestor to get the class for, see examples
`...`	`ANY` Objects to `vapply` over
`objects`	`(list(1))` Alternative constructor with `list` of objects

Details

`object_classes` is a stripped-down wrapper to get the class of multiple objects

Examples

```
library(R6)

class_a <- R6Class("class_a")
class_b <- R6Class("class_b", inherit = class_a)
class(class_b$new())
object_class(class_b$new())
object_class(class_b$new(), 1)
```

`ooplah` *R6 Class for testing and examples*

Description

R6 Class for testing and examples

`private` *Get R6 object private environment*

Description

Access the private environment of an R6 object

Usage

```
private(x)
```

Arguments

`x`	(R6) R6 object to get environment from, errors if not R6

`super` *Get R6 object parent environment*

Description

Access the parent environment of an R6 object

Usage

```
super(x)
```

Arguments

`x`	(R6) R6 object to get environment from, errors if not R6

vxapply *Specialised vapply methods for atomic classes*

Description

Specialised vapply functions for scalars of each of the six atomic classes in R:

Usage

```
vlapply(X, FUN, ..., USE.NAMES = TRUE)

viapply(X, FUN, ..., USE.NAMES = TRUE)

vnapply(X, FUN, ..., USE.NAMES = TRUE)

vcapply(X, FUN, ..., USE.NAMES = TRUE)

vzapply(X, FUN, ..., USE.NAMES = TRUE)

vrapply(X, FUN, ..., USE.NAMES = TRUE)
```

Arguments

X, ..., USE.NAMES	See vapply
FUN	Either a function to apply to each element of X, as in vapply or the field/method name of an OOP object (see examples)

Details

- logical (vlapply)
- integer (viapply)
- numeric/real (vnapply)
- character/string (vcapply)
- complex (vzapply)
- raw (vrapply)

These are simply wrappers around vapply where FUN.VALUE is pre-filled with a scalar of the given class.

In addition these can be applied to pull-out fields or methods from R6 or other OOP objects by supplying the field/method name to FUN. See examples.

Examples

```
## Specialised vapply
vlapply(logical(10), identity)
vzapply(complex(10), identity)

## For R6 objects
objs <- list(ooplah$new(), ooplah$new())

# Public field
vcapply(objs, "oop")

# Public method
vcapply(objs, "exclaim", "ARGH")
vcapply(objs, "hello")
vnapply(objs, "generate", 1)

# Active binding
vlapply(objs, "logically")
```

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