Want to know an environment's name in R? Use package `envnames`

Introduction

If you are used to working with your own environments –for instance when developing a package– you may have been frustated by the output of running a code similar to the following:

```
myenv <- new.env()
environmentName(myenv)
## [1] ""
```

The frustration may have come when you see the empty string in the output from the environmentName() function, instead of `myenv`.

Gladly, the environment_name() function in the recently released envnames package comes to our rescue in these situations, as explained in the upcoming sections.

The `environment_name()` function does give us the name of the environment

We can use the environment_name() function of the package to retrieve the name of the user-defined environment we created above:

```
library(envnames)
environment_name(myenv)
## [1] "myenv"
```

or

```
library(envnames)
environment_name(address(myenv))
## [1] "myenv"
```

where we have used the package's address() function to show that the **environment name can also be retrieved from the environment's memory address**, which is where this function becomes truly useful.

In fact, this may come handy when debugging a program and navigating through environments. In those situations it is not rare to come across a memory address that represents an environment and we may want to know which environment it represents. To this end, we can simply copy & paste the memory address shown in the R console (e.g. `"<environment: 0x00000000147499b0>"`) and run `environment_name("<environment: 0x00000000147499b0>")` to get the name of the environment represented by the memory address.

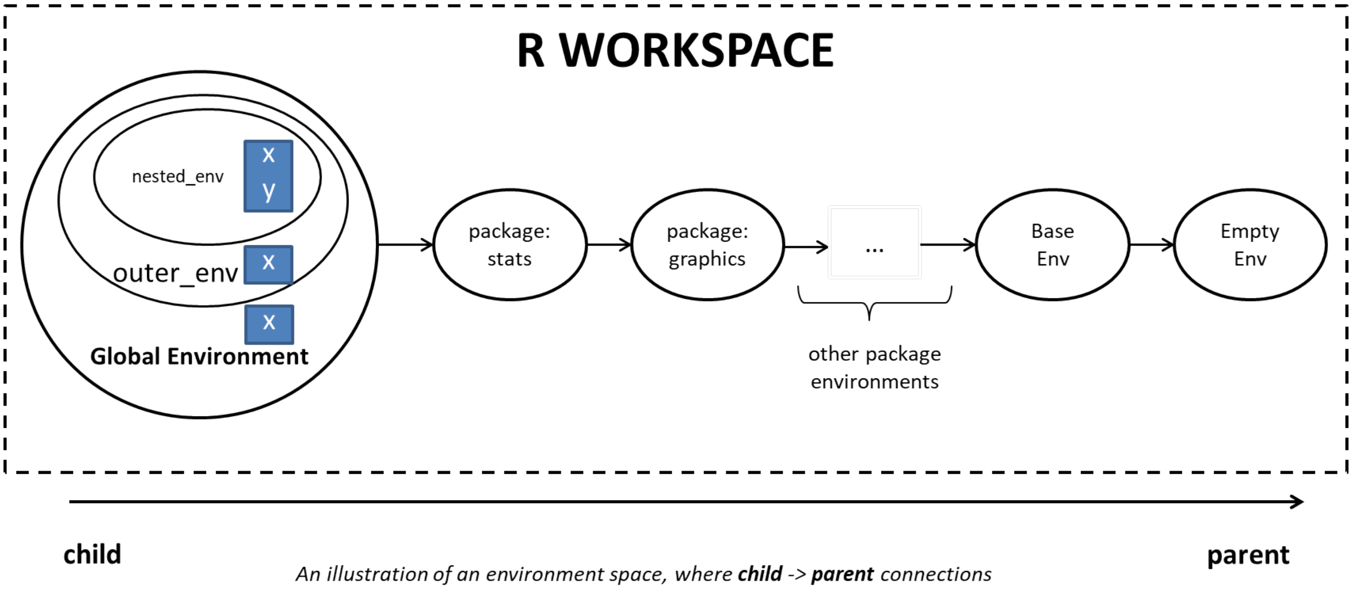
How it works

The `envnames` package is capable of accessing the name of *any* environment –be it a system environment, a package, a namespace, a user-defined environment, or even a function execution environment– by way of a lookup table that maps environment names to their memory addresses. The lookup table is created every time one of the 11 visible functions defined in the package is run, thus updating the map to the latest changes in the workspace.

Capabilities worth mentioning

Looking for an object in user-defined environments

The following picture shows an environment space that highlights the connections between package and system environments (child `->` parent relationships) and in particular the use of user-defined environments (`outer_env` and `nested_env`), which are part of the global environment and may be regarded as *nested* environments (within the global environment).



*An illustration of an environment space, where **child** -> **parent** connections are shown between environments, and objects **x** and **y** (shown in **blue boxes**) are defined in user environments which may be **nested**.*

The package includes the obj_find() function that is able to look for objects in the whole workspace **including user-defined environments**, even if they are **nested in other user environments**.

This is an important feature because the R built-in function exists() does *not* look for objects in user-defined environments, but only in system and package environments. The only way to make `exists()` look for objects in user-defined environments is to specify them explicitly –*but this doesn't help if we don't know where the object may reside!*

The following example illustrates the above limitations of the `exists()` function, and how such limitations are overcome with the `obj_find()` function.

First we define the necessary environments, including objects `x` and `y`, as shown in the picture:

```
outer_env <- new.env()
outer_env$nested_env <- new.env(parent=emptyenv())
x <- 0
with(outer_env, x <- 3)
with(outer_env,
    {
        nested_env$x <- 5.7;
        nested_env$y <- "phrase"
    })
```

Now we check whether the objects exist using the `exists()` function:

```
cat("\n'x' exists?: ", exists("x"), "\n")
cat("\n'y' exists?: ", exists("y"), "\n")
##
## 'x' exists?:  TRUE
##
## 'y' exists?:  FALSE
```

We clearly see two important limitations of the `exists()` function:
- it does *not* check for existence in *user-defined* environments (`y` is not found, but it exists in the `nested_env` environment),
- if the object exists, it doesn't tell us *where* it is found.

Instead, the following calls to the `obj_find()` function tell us the whole picture and is informative about the location of the objects (if existing):

```
cat("\nObject 'x' is found in the following environments:\n",
    paste(obj_find(x), collapse="\n"), "\n", sep="")
cat("\nObject 'y' is found in the following environments:\n",
    paste(obj_find(y), collapse="\n"), "\n", sep="")
cat("\nObject 'nonexisting' is found in the following environments:\n",
    paste(obj_find(nonexisting), collapse="\n"), "\n", sep="")
##
## Object 'x' is found in the following environments:
## outer_env
## outer_env$nested_env
## R_GlobalEnv
##
## Object 'y' is found in the following environments:
## outer_env$nested_env
##
## Object 'nonexisting' is found in the following environments:
```

Not only is object `y` found, but object `x` is found in *all* three environments where it is defined, including the user-defined environments `outer_env` and `nested_env`, despite the fact that `nested_env` is *nested* in `outer_env`. The path to reach each object is shown using the `$` notation, which is the symbol used to access the object's value, as achieved by `outer_env$nested_env$x`.

Looking for an object in a function's execution environment

If we are working inside a function, we could also look for objects defined in the function calling chain by specifying `include_functions=TRUE`, as shown in the following example:

```
h <- function() {
    x <- 10.37
    cat("Object 'x' is found in the following environments:\n",
        paste(obj_find(x, include_functions=TRUE), collapse="\n"), "\n", sep="")
}
env1 <- new.env()
with(env1,
    g <- function() {
        x <- 2
        h()
    }
)
env1$g()
## Object 'x' is found in the following environments:
## env1$g
## eval
## h
## handle
## outer_env
## outer_env$nested_env
## process_group
## process_group.block
## R_GlobalEnv
## timing_fn
## withVisible
```

where we see all the (8) function environments where `x` has been passed during the execution of the code, plus three non-function environments. For now, regular environments cannot be distinguished from function environments in the output returned by `obj_find()`, but this will be improved in a future release where the plan is to add the `()` symbol at the end of function environment names, e.g. `env1$g()`.

Summary

We have seen a few ways in which the envnames package can help us work with user-defined environments, namely:
- use the obj_find() function to **look for objects** in the workspace, and **retrieve the name of the environments** where they reside, be it a system environment, a package, a namespace, a **user-defined environment** or, when working inside a function, the name of the function whose execution environment is hosting the object.
- use the environment_name() function to **find the name of an environment given its memory address** (specially useful in debug contexts)

To learn more about further capabilities provided by the package, I invite you to take a look at the **vignette**.

Finally, if you decide to install the package and use it, I would be very happy to learn about your use cases, so just drop me a comment below.

References

Motivation for writing this package: https://stat.ethz.ch/pipermail/r-help/2010-July/245646.html (question by Gabor Grothendieck at a forum on R in 2010)

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Session Info

This article was generated with envnames-v0.4.0 on the following platform and R version:

```
##          SystemInfo
## sysname     Windows
## release      10 x64
## version build 17134
## machine      x86-64
##                _
## platform       x86_64-w64-mingw32
## arch           x86_64
## os             mingw32
## system         x86_64, mingw32
## status
## major          3
## minor          5.2
## year           2018
## month          12
## day            20
## svn rev        75870
## language       R
## version.string R version 3.5.2 (2018-12-20)
## nickname       Eggshell Igloo
```