Professional R development

using git, GitHub, Travis CI, testthat, lintr, covr, Codecov and goodpractice

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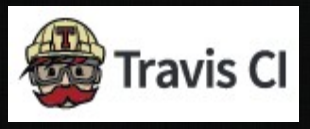
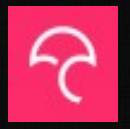
http://www.github.com/richelbilderbeek/PresentationsAboutR





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What? Why? Mastery?

- What: follow all good practices by default
- Why: proven to pay off
- Mastery: set up tools to follow all good practices by default

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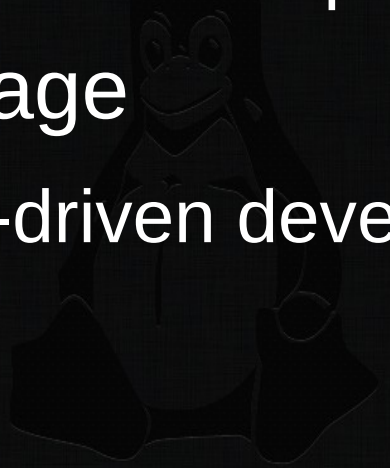
Not about ...

- How to create a package
  - See the talk 'How to develop a package'
- Extending a package
  - See the talk 'Test-driven development'



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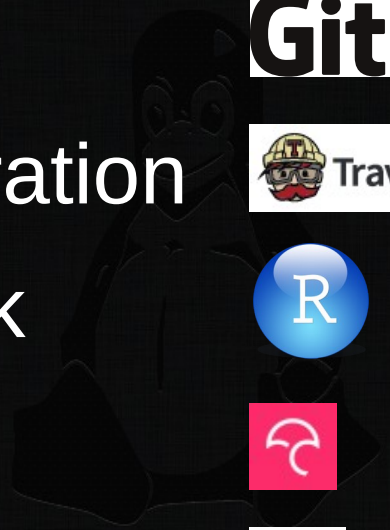
Setup

- Version control
- Code hosting
- Continuous integration
- Testing framework
- Code coverage
- Static code analysis

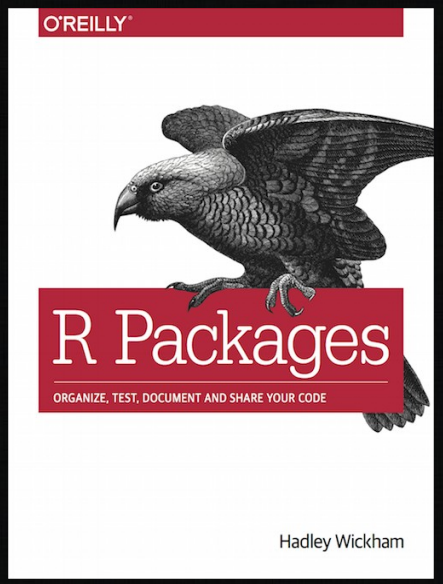


Version control

- Keeps a history of code

Rule 9:
Do source code management

Keynote Speech at useR!, 2014



If you are serious about software development, you need to learn about git

Chapter 13: git and GitHub

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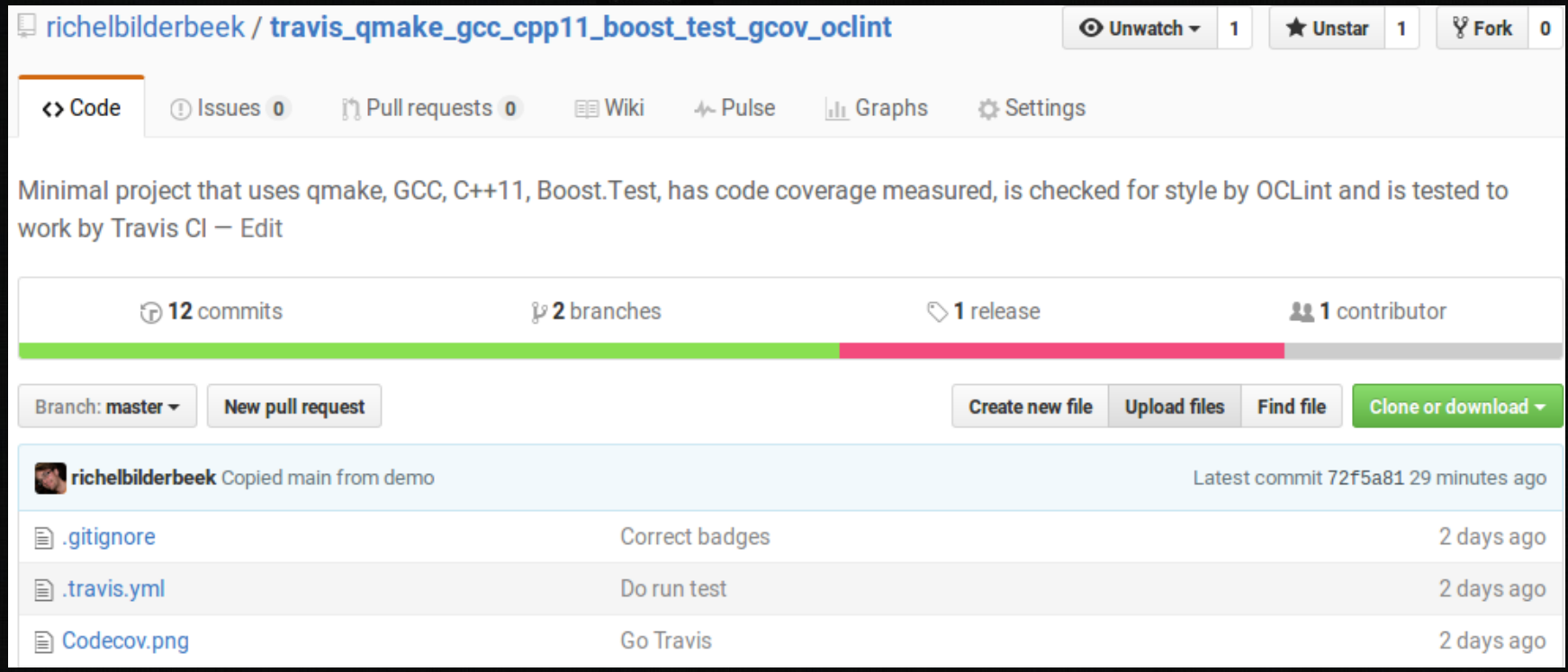
Code hosting

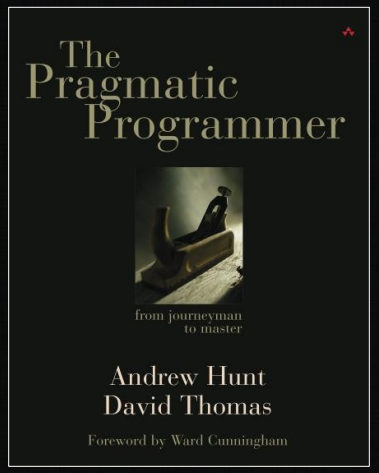
- Host your (version controlled) code
- Using GitHub is good practice [1]



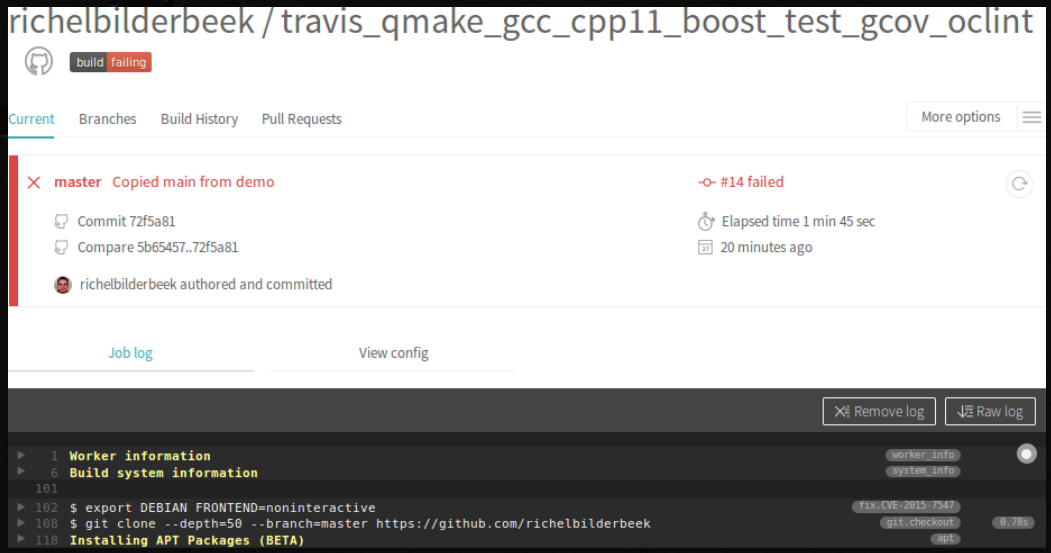
[1] Perez-Riverol, Yasset, et al. "Ten Simple Rules for Taking Advantage of git and GitHub." bioRxiv (2016): 048744.

Continuous integration

- Run scripts upon pushing new code



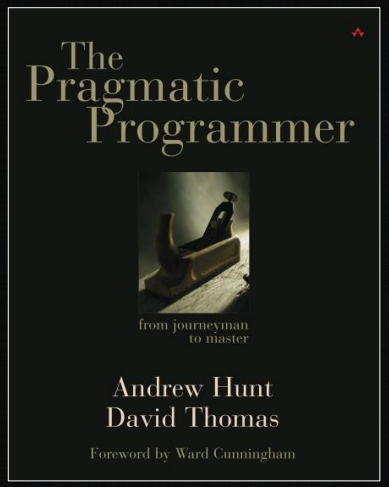
Tip 61: Don’t Use Manual Procedures



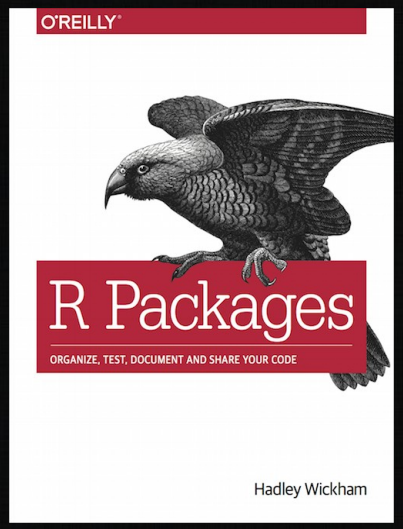
Travis CI

Testing framework

- To test your code



Tip 62: Test Early.
Test Often. Test Automatically



Testing is a vital part of package development

Fewer bugs
Better code structure
Easier restarts
Robust code

Chapter 7: Testing

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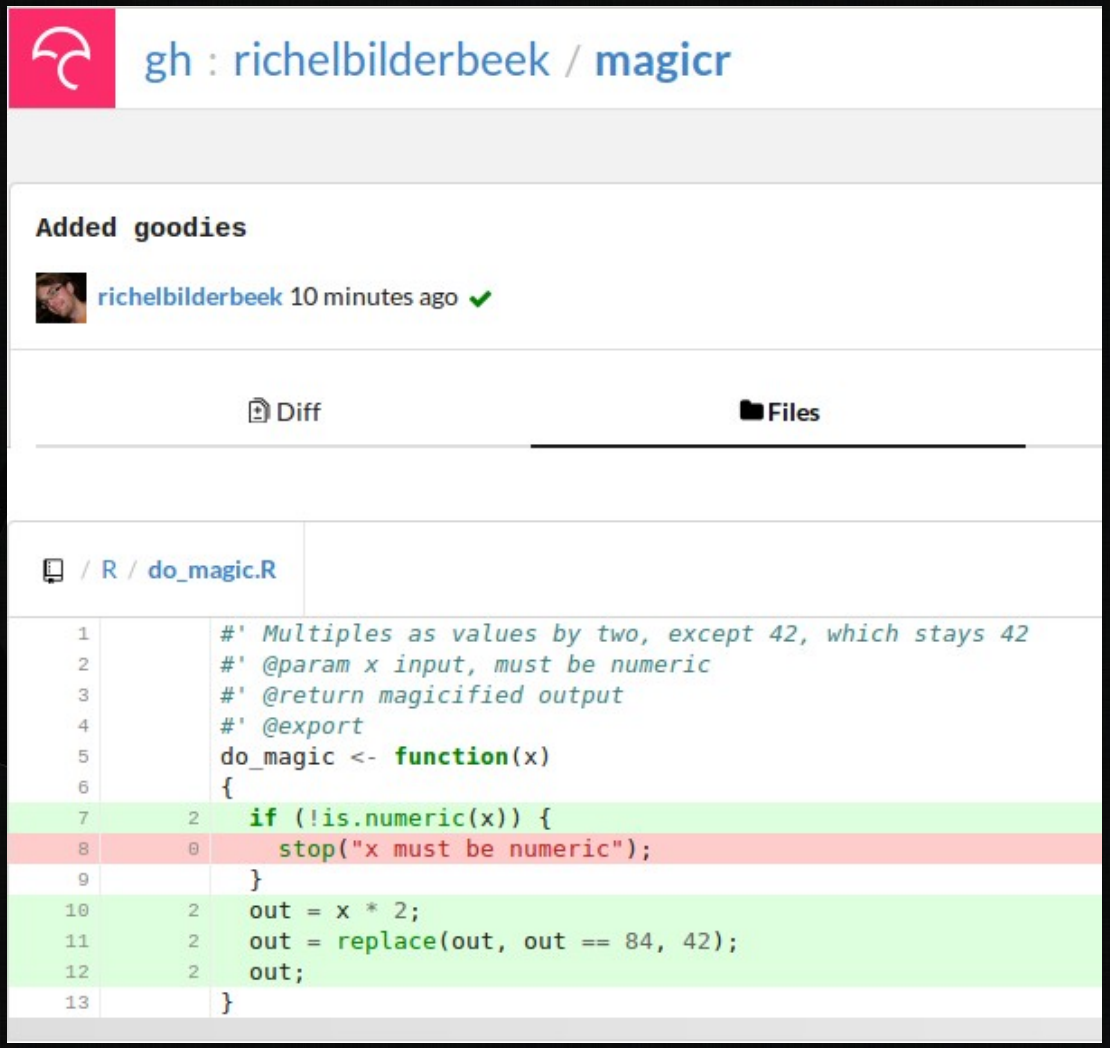
Code coverage

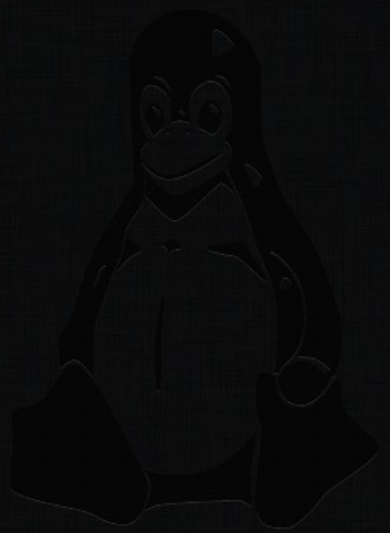
- Measures code that is actually used
- Correlates with quality [1]



[1] Del Frate, Fabio, et al. "On the correlation between code coverage and software reliability." Software Reliability Engineering, 1995. Proceedings., Sixth International Symposium on. IEEE, 1995.

Test for good practices

- Checks code beyond the interpreter



```
It is good practice to

  ✖ omit trailing semicolons from code lines. They are not
    needed and most R coding standards forbid them
```

This presentation

- Introduce the package 'magicr'
- (Put it on GitHub)
- Activate Travis CI
- Activate other tools

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do_magic.R

```
#' Multiples as values by two,
#'   except 42, which stays 42
#' @param x input, must be numeric
#' @return magicified output
#' @export
do_magic <- function(x)
{
  if (!is.numeric(x)) {
    stop("x must be numeric");
  }
  out = x * 2;
  out = replace(out, out == 84, 42);
  out;
}
```

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test-do_magic.R

```
context("do_magic")


test_that("do_magic: use", {
  expect_equal(do_magic(42), 42)
  expect_equal(do_magic(1), 2)
})
```

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Output

```
==> devtools::test()


Loading prde
Loading required package: testthat
Testing prde
do_magic: ..


DONE
```

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Next steps

- Create a GitHub repository
- Clone it to the local computer
- Put your code in that folder
- Upload the code

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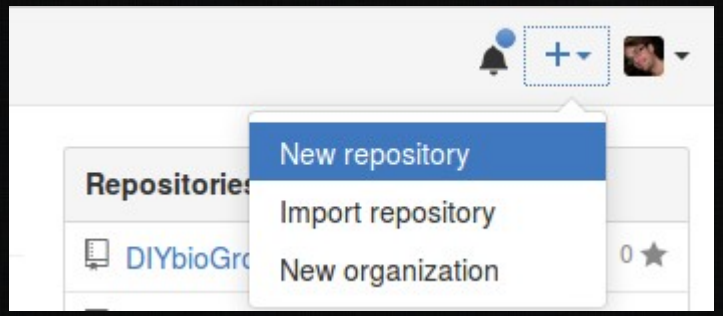
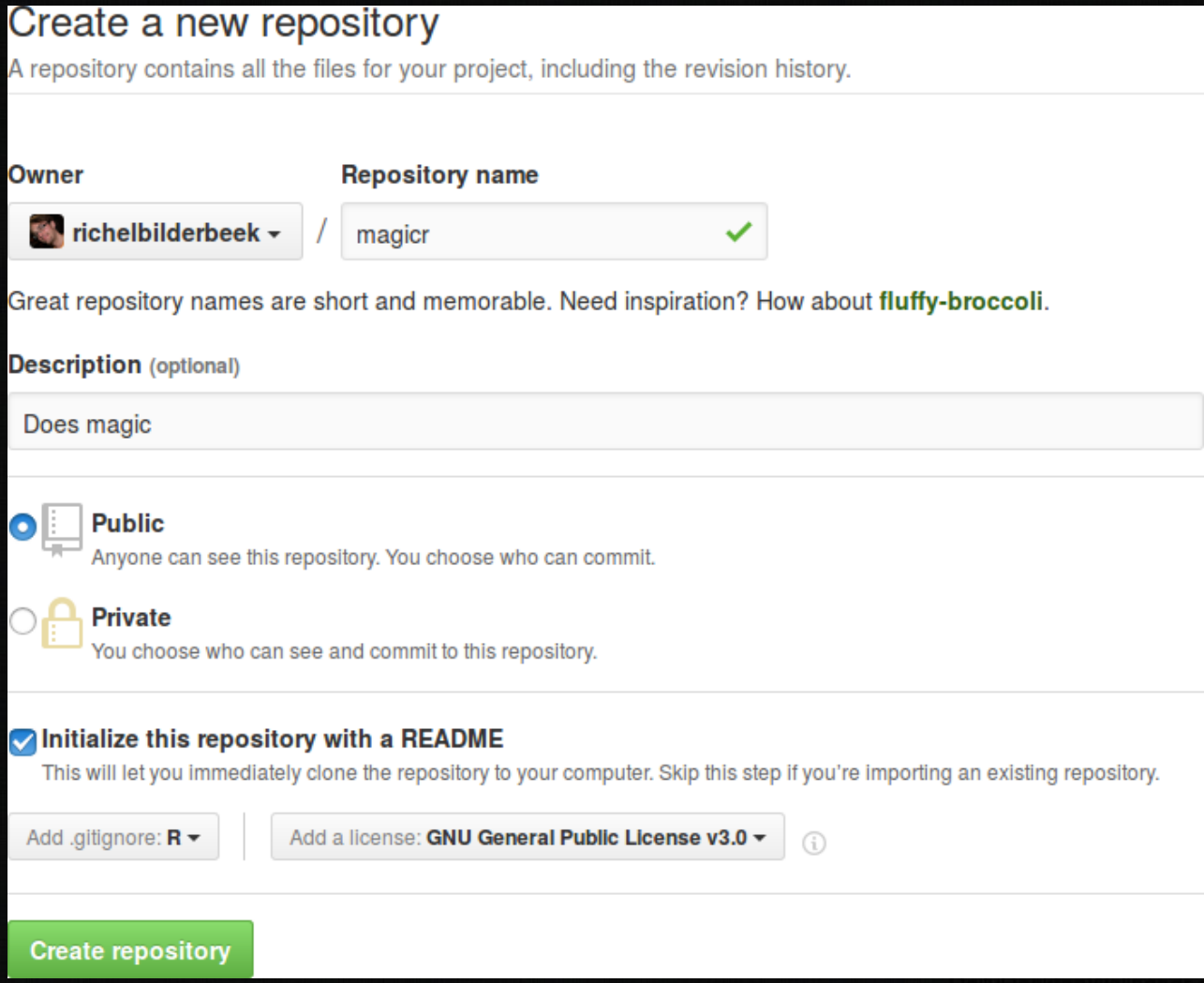
Create a GitHub repository

- Create a new repository





Clone it to the local computer

- git clone https://github.com/[username]/[repository name]

- (Wouldn't it be nice if this step could also be done from R studio?)

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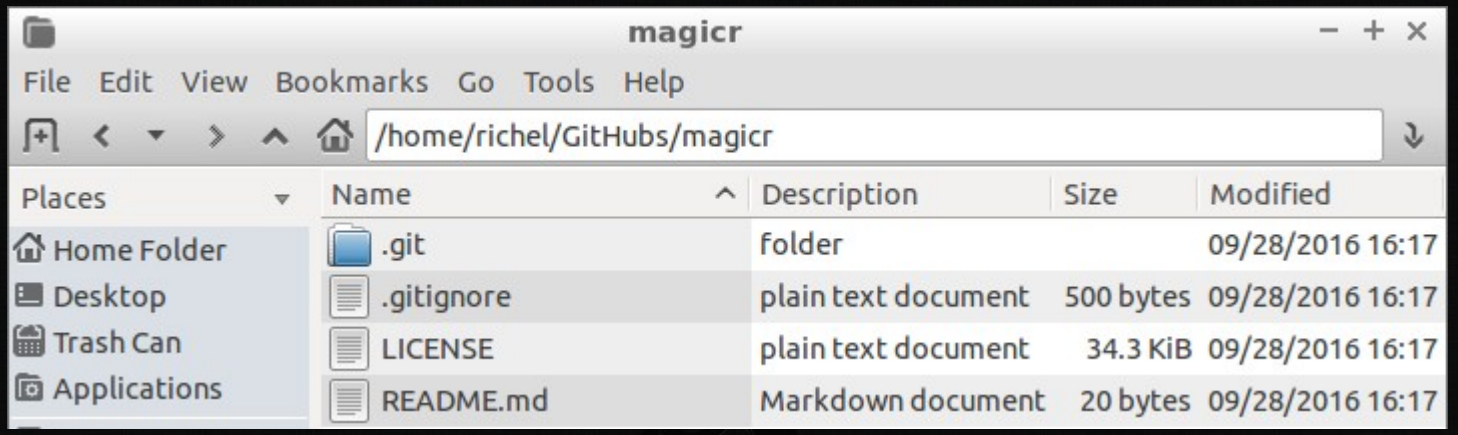
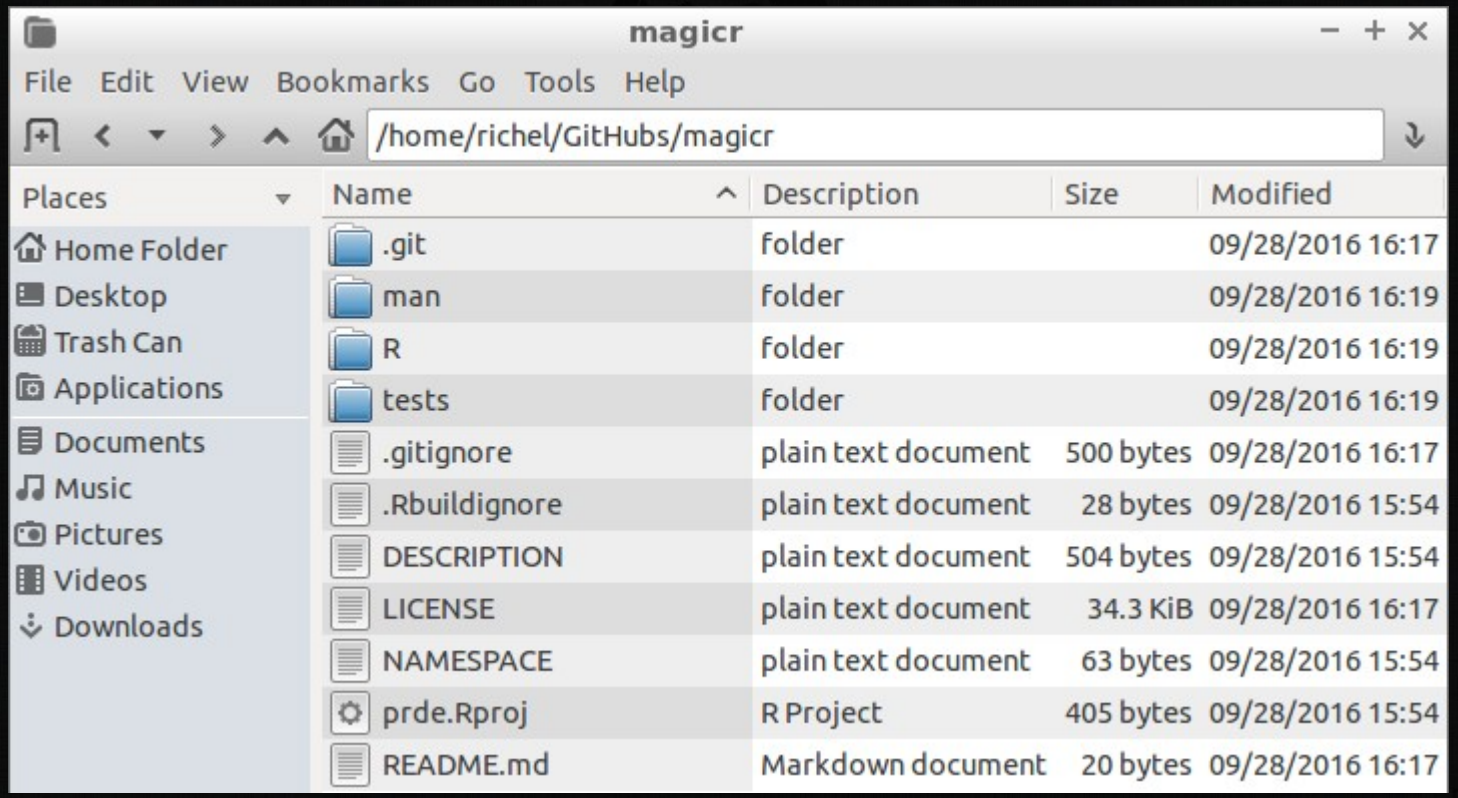
Put your code in that folder





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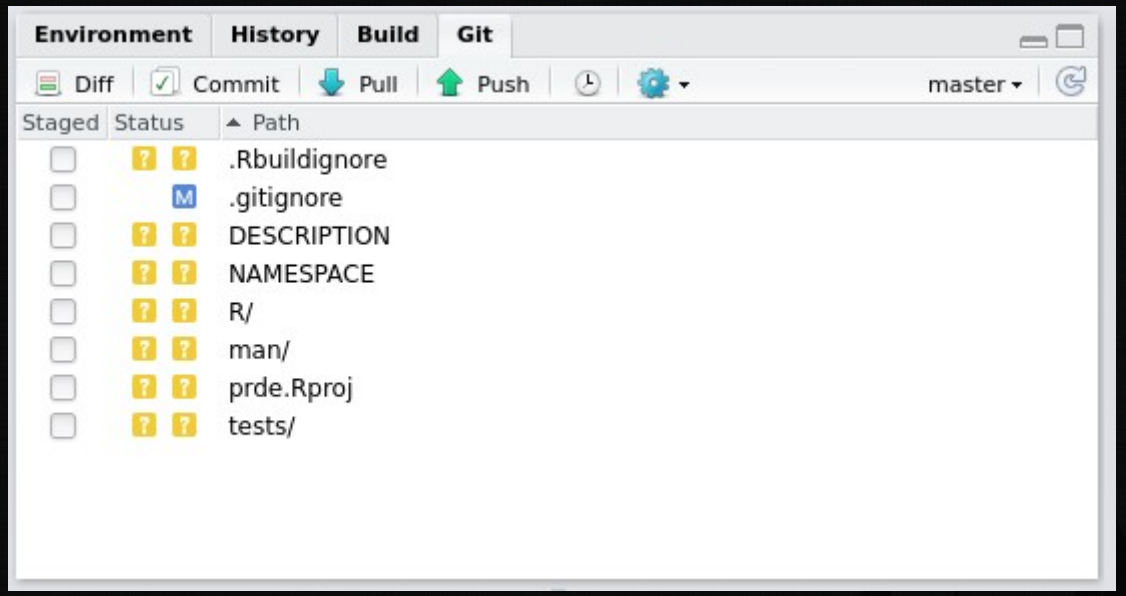
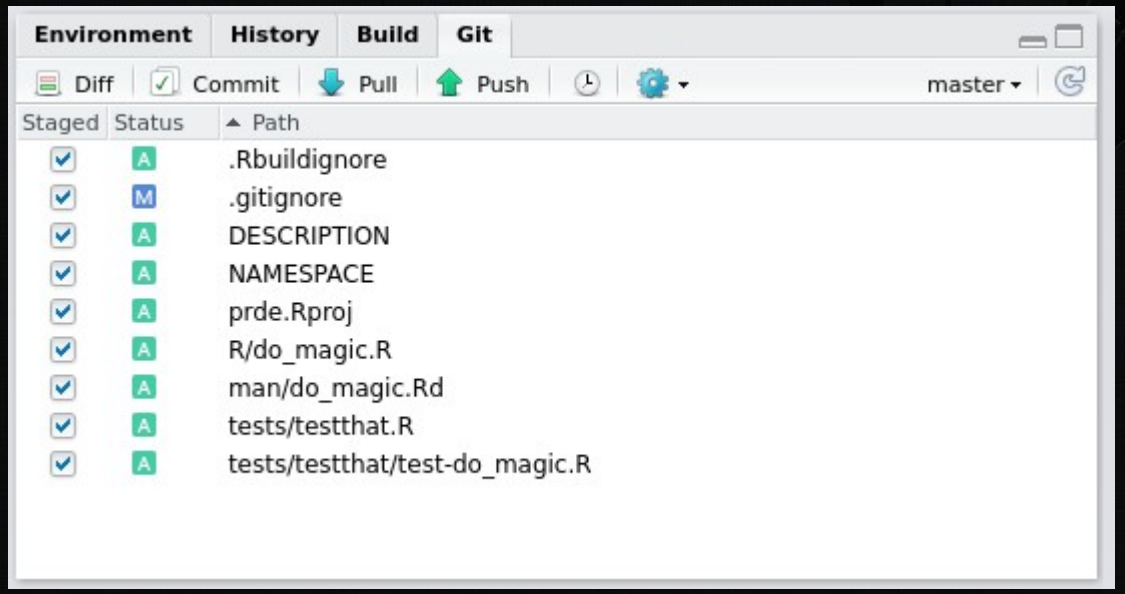
Push it to GitHub





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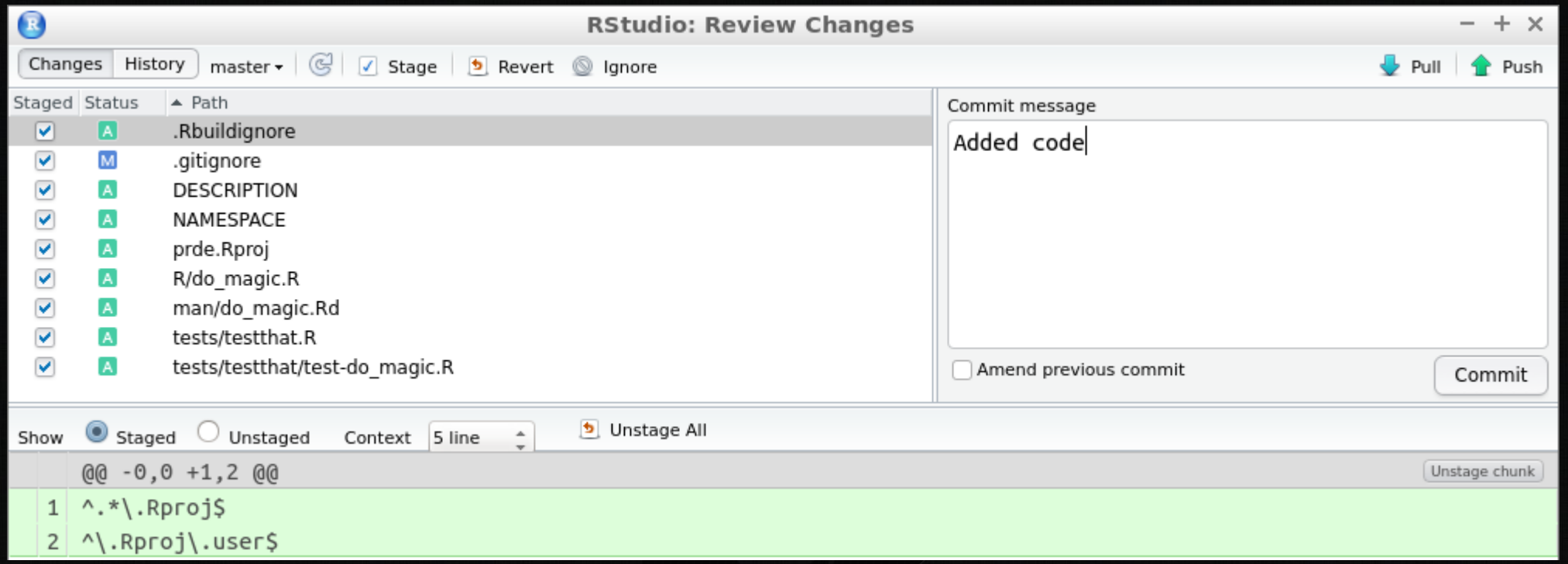
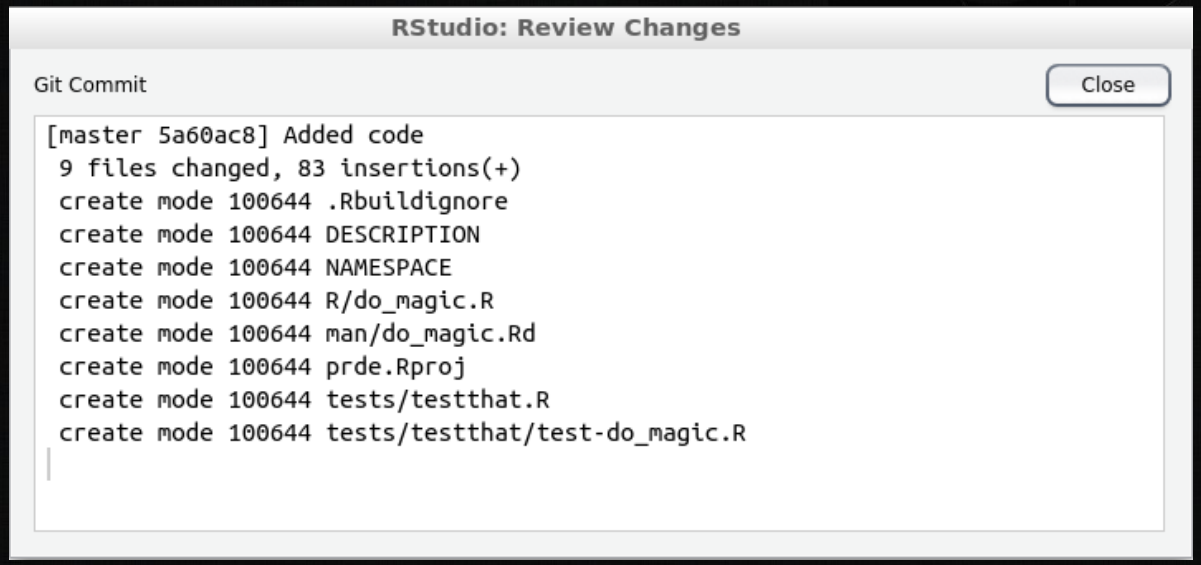
Push to GitHub





- Then push!

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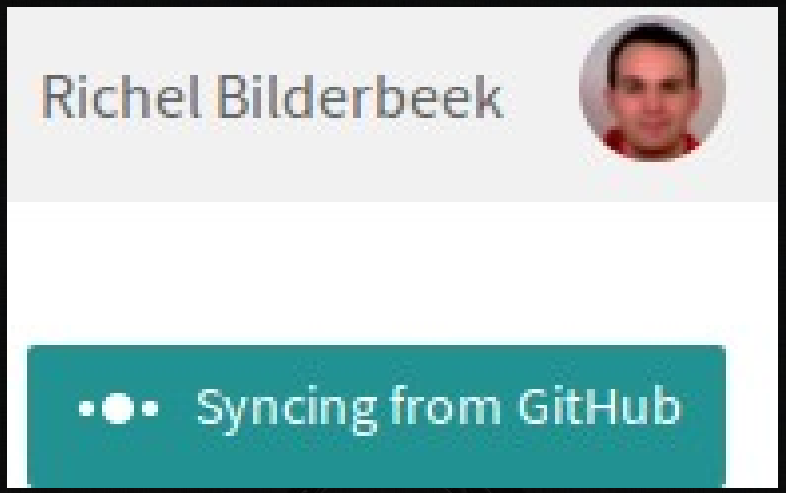
Activate Travis CI



Add file .travis.yml to root of package

```
language: r
cache: packages
```

- Then push to GitHub
- Then wait ...

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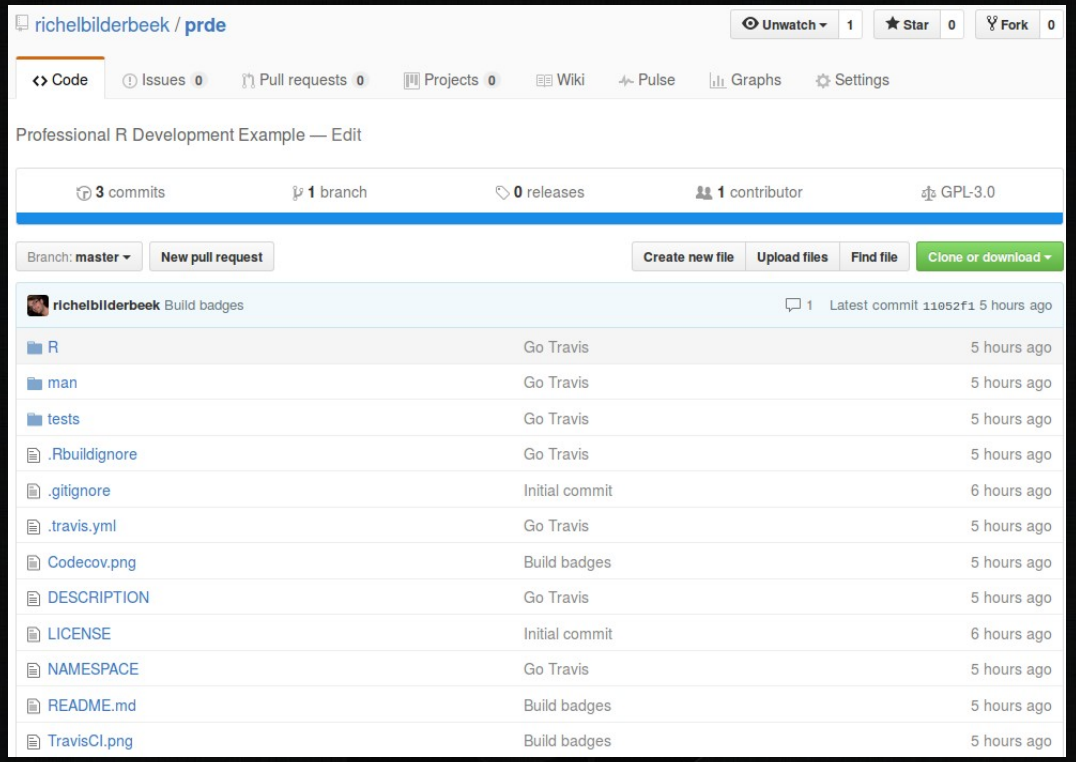
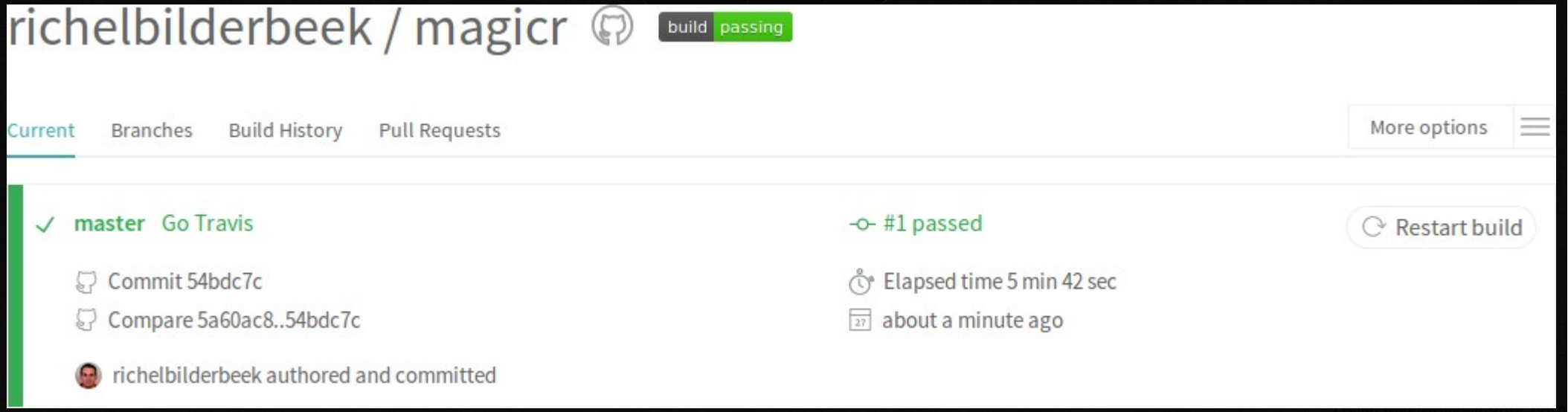
Success


richelbilderbeek / prde
Unwatch 1
Star 0
Fork 0
Code
Issues 0
Pull requests 0
Projects 0
Wiki
Pulse
Graphs
Settings
Professional R Development Example — Edit
3 commits
1 branch
0 releases
1 contributor
GPL-3.0
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
richelbilderbeek Build badges
1
Latest commit 11052f1 5 hours ago
R Go Travis 5 hours ago
man Go Travis 5 hours ago
tests Go Travis 5 hours ago
.Rbuildignore Go Travis 5 hours ago
.gitignore Initial commit 6 hours ago
.travis.yml Go Travis 5 hours ago
Codecov.png Build badges 5 hours ago
DESCRIPTION Go Travis 5 hours ago
LICENSE Initial commit 6 hours ago
NAMESPACE Go Travis 5 hours ago
README.md Build badges 5 hours ago
TravisCI.png Build badges 5 hours ago

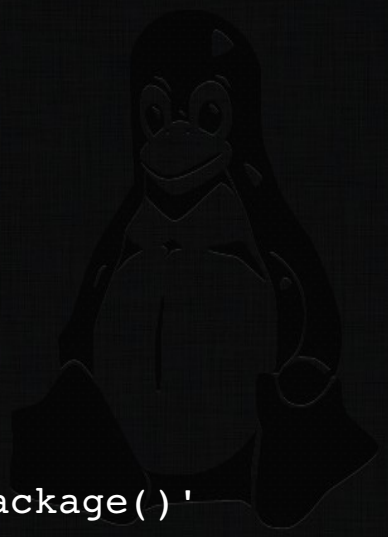

richelbilderbeek / magicr
build passing
Current
Branches
Build History
Pull Requests
More options
master Go Travis
#1 passed
Restart build
Commit 54bdc7c
Compare 5a60ac8..54bdc7c
Elapsed time 5 min 42 sec
about a minute ago
richelbilderbeek authored and committed

Activate other tools

```
language: r
cache: packages

r_github_packages:
  - jimhester/lintr
  - jimhester/covr
  - MangoTheCat/goodpractice

after_success:
  - Rscript -e 'lintr::lint_package()'
  - Rscript -e 'library(covr); codecov()'
  - Rscript -e 'library(goodpractice); gp()'
```



- Then push to GitHub
- Then wait ...

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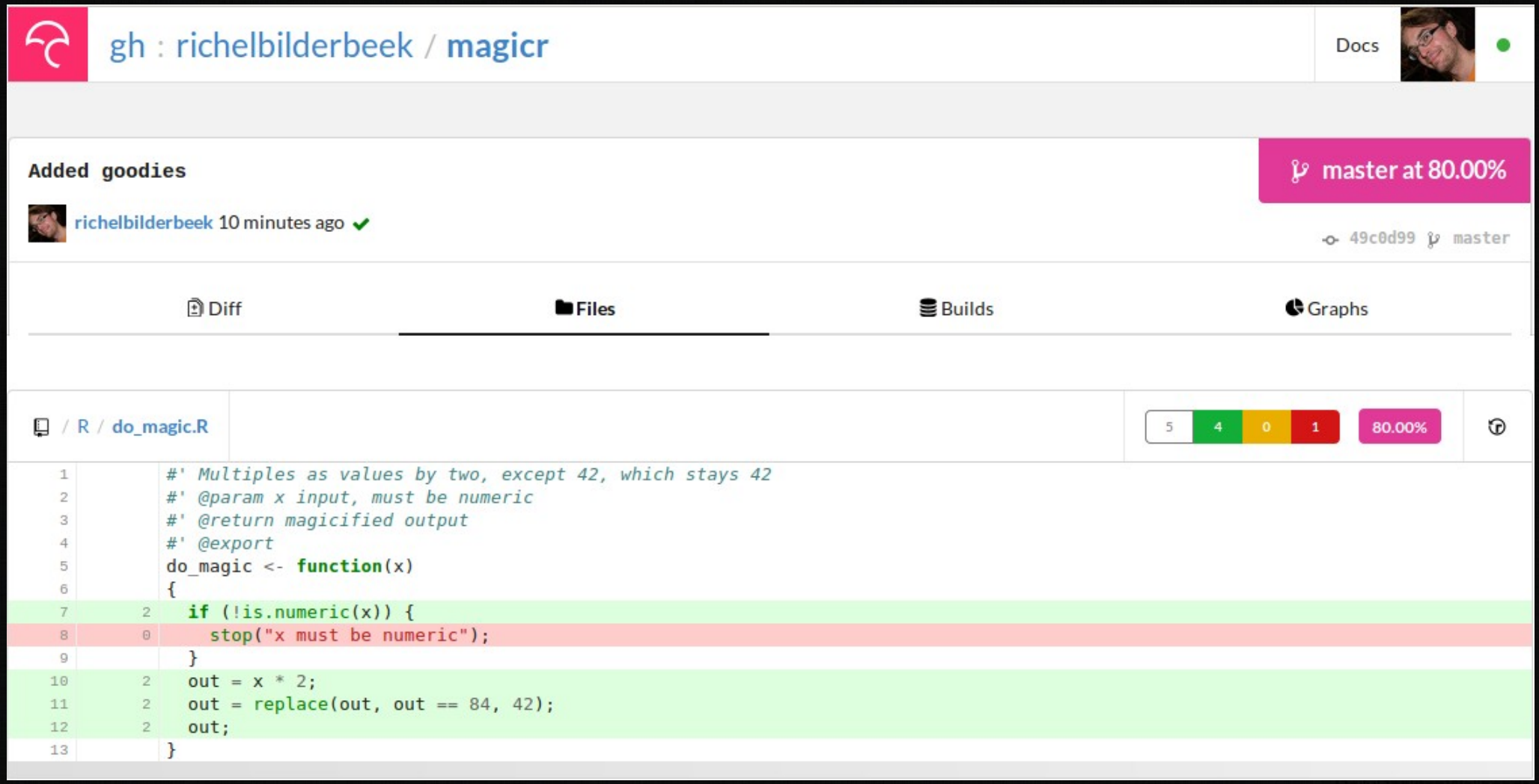
Results: code coverage



Results: lintr

```
1784 $ Rscript -e 'lintr::lint_package()'                                after_success
1785 R/do_magic.R:6:1: style: Opening curly braces should never go on their own line and should always be followed by a new line.
1786 {
1787 ^
1788 R/do_magic.R:10:7: style: Use <-, not =, for assignment.
1789   out = x * 2;
1790       ^
1791 R/do_magic.R:11:7: style: Use <-, not =, for assignment.
1792   out = replace(out, out == 84, 42);
1793       ^
1794
```

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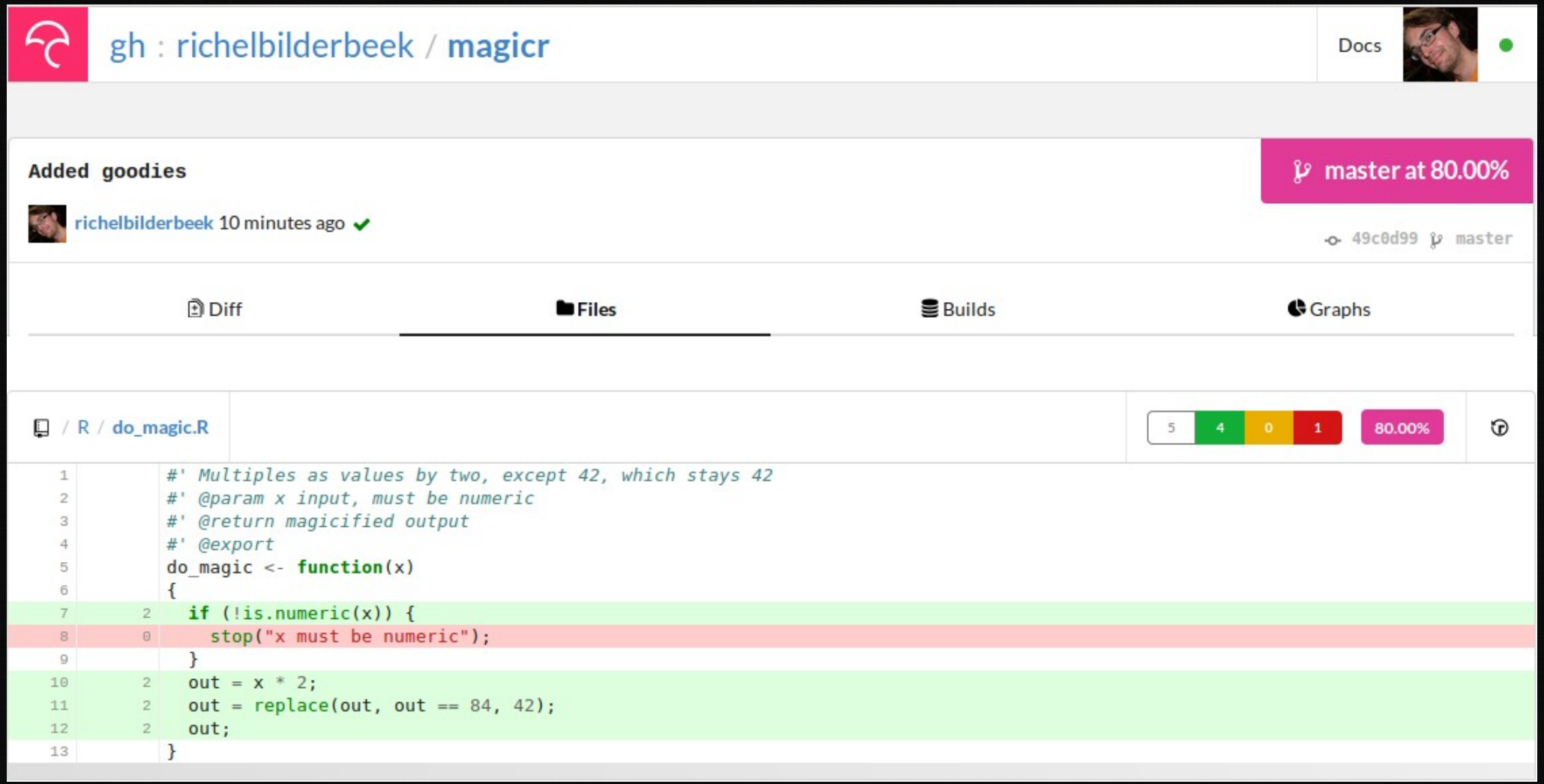
Results: code coverage



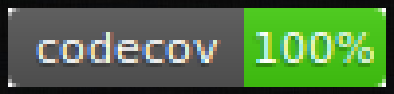
Results: goodpractice

```
It is good practice to

  ✖ omit trailing semicolons from code lines. They are not
    needed and most R coding standards forbid them
```

My experiences

- Due to this setup, I have
  - Responded to bugs faster

  - Found and removed dead code 

  - Learned a professional R coding standard
  - Reduced complexity of working code
  - Learned new things
  - Allow collaborators to do the same

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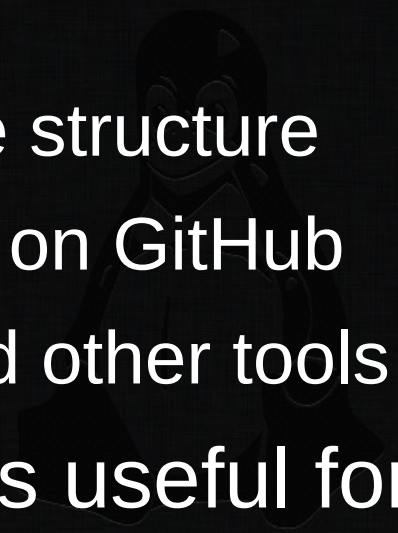
Conclusion

- It is doable to follow all good practices in three steps:
  - Follow a package structure
  - Put that package on GitHub
  - Add Travis CI and other tools
- I think this setup is useful for
  - C++ newbies
  - C++ pros



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