

ghclass

an R package for managing classes with GitHub

JSM 2019 · Denver

bit.ly/JSM2019_ghclass

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Reproducible Assignments

Goals:

- Teach (enforce) version control and reproducible workflows
- Encourage (enforce) collaboration
- Embrace modern tools and methods

Organization:

- Core toolkit: R + RStudio + RMarkdown
- Spend 1 lecture on git / GitHub
- GitHub setup:
 - 1 organization / course
 - 1 repo / (team | student) / assignment
- Randomly assigned teams of 3-4 students / assignment

Setup

1. Signup for a GitHub Account

github.com

2. Get a GitHub personal access token (PAT)

github.com/settings/tokens

3. Setup git and GitHub access in R

**use this [setup vignette](#) &
[happy git with R](#)**

4. Signup for GitHub Education

education.github.com/benefits

5. Create a GitHub Organization for your class

github.com/organizations/new

Only **Step 5** needs to be repeated for a new class!

Introduction to ghclass

```
devtools::install_github("rundel/ghclass")  
library(ghclass)
```

Some design principals behind this package:

1. Functions are prefixed with `org`, `repo`, `team`, `github` or `local_repo` to indicate what they operate on.
2. Functions are vectorized over their parameters (batch related operations).
3. Be verbose about what is happening, report failures but don't halt execution.
4. Most actions are non-destructive (backed by git), the handful of dangerous operations will warn you.
5. Follow the unix design philosophy, work towards simple & composable functions

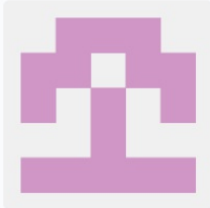
Org & Roster

We will be using **ghclass-demo** as our class organization, hopefully your Org has a slightly more informative name .

(I find `course#-semester` works well, e.g. `Sta323-Sp19`).

```
(roster = readr::read_csv("files/roster.csv"))
```

```
## # A tibble: 6 x 4
##   netid email          github          hw01
##   <chr> <chr>          <chr>          <chr>
## 1 za17  anya@school.edu ghclass-anya    hw01-team01
## 2 kb34  bruno@school.edu ghclass-bruno    hw01-team01
## 3 ac13  celine@school.edu ghclass-celine   hw01-team02
## 4 bd88  diego@school.edu ghclass-diego    hw01-team02
## 5 se01  elijah@school.edu ghclass-elijah   hw01-team03
## 6 df00  francis@school.edu ghclass-francis  hw01-team03
```




ghclass-demo

 **Repositories**

 Packages

 People **3**

 Teams

 Projects

 Settings

This organization has no repositories.

Create a new repository

Top languages

 R

People

3 >



Invite someone



Checking your git / GitHub config

```
github_test_token()
```

```
## Your github token is functioning correctly.
```

```
usethis::git_sitrep()
```

```
## Git user
## * Name: 'Colin Rundel'
## * Email: 'rundel@gmail.com'
## * Vaccinated: TRUE
## usethis + git2r
## * Default usethis protocol: <unset>
## * git2r supports SSH: TRUE
## * Credentials: '<user-provided git2r credential object with class cred_ssh_key>'
## GitHub
## * Personal access token: '<found in env var>'
## * User: 'rundel'
## * Name: 'Colin Rundel'
## Repo
## * Path: '/Users/rundel/Desktop/Presentations/.git'
## * Local branch -> remote tracking branch: 'master' -> 'origin/master'
## GitHub pull request readiness
## * origin: rundel/Presentations, can push
## * upstream: '<no such remote>'
```

Inviting Students

```
org_invite(org = "ghclass-demo", user = roster$github)
```

```
##      Invited user 'ghclass-anya' to org 'ghclass-demo'.  
##      Invited user 'ghclass-bruno' to org 'ghclass-demo'.  
##      Invited user 'ghclass-celine' to org 'ghclass-demo'.  
##      Invited user 'ghclass-diego' to org 'ghclass-demo'.  
##      Invited user 'ghclass-elijah' to org 'ghclass-demo'.  
##      Invited user 'ghclass-francis' to org 'ghclass-demo'.
```

```
org_members("ghclass-demo", include_admins = FALSE)
```

```
## character(0)
```

```
org_pending_members("ghclass-demo")
```

```
## [1] "ghclass-anya"      "ghclass-bruno"     "ghclass-diego"     "ghclass-elijah"  
## [5] "ghclass-francis"  "ghclass-celine"
```




ghclass-demo



Repositories



Packages



People 3



Teams



Projects



Settings



Find a member...

Members

Outside collaborators

Invite member

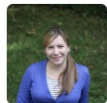


Select all

6 pending invitations

2FA ▾

Role ▾



Mine Cetinkaya-Rundel

mine-cetinkaya-rundel

2FA ✓



Private

Owner

0 teams



Colin Rundel

rundel

2FA ✕



Private ▾

Owner

0 teams



Therese Anders

thereseanders

2FA ✕



Private

Owner

0 teams





ghclass-demo



Repositories



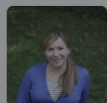
Packages



Find a member...



Select all



Mine Cetinkaya-Rundel
mine-cetinkaya-rundel



Colin Rundel
rundel



Therese Anders
thereseanders

Pending invitations



ghclass-any
ghclass-any

Edit invitation



ghclass-bruno
ghclass-bruno

Edit invitation



ghclass-celine
ghclass-celine

Edit invitation



ghclass-diego
ghclass-diego

Edit invitation



ghclass-elijah
ghclass-elijah

Edit invitation



ghclass-francis
ghclass-francis

Edit invitation

Invitations are sent via email and can be accepted at
<https://github.com/ghclass-demo>

Invite member

Pending invitations

2FA

Role

Owner

0 teams



Owner

0 teams



Owner

0 teams



A few days later ...

```
org_members("ghclass-demo", include_admins = FALSE)
```

```
## [1] "ghclass-anya" "ghclass-bruno" "ghclass-celine" "ghclass-diego"
```

```
org_pending_members("ghclass-demo")
```

```
## [1] "ghclass-elijah" "ghclass-francis"
```

several emails and a week later ...

```
org_members("ghclass-demo", include_admins = FALSE)
```

```
## [1] "ghclass-anya" "ghclass-bruno" "ghclass-celine" "ghclass-diego"  
## [5] "ghclass-elijah" "ghclass-francis"
```

```
org_pending_members("ghclass-demo")
```

```
## character(0)
```



ghclass-demo



Repositories



Packages



People 9



Teams



Projects



Settings



Find a member...

Members

Outside collaborators

Invite member



Select all

2FA ▾

Role ▾



ghclass-any

2FA ✕

Private

Member

0 teams



ghclass-bruno

2FA ✕

Private

Member

0 teams



ghclass-celine

2FA ✕

Private

Member

0 teams



ghclass-diego

2FA ✕

Private

Member

0 teams



ghclass-elijah

2FA ✕

Private

Member

0 teams



Team Assignment

```
org_create_assignment(org = "ghclass-demo", repo = roster$hw01, user = roster$github,  
                      team = roster$hw01, source_repo = "Sta323-Sp19/hw1")
```

```
## Created repo 'ghclass-demo/hw01-team01'.  
## Created repo 'ghclass-demo/hw01-team02'.  
## Created repo 'ghclass-demo/hw01-team03'.  
## Created team 'hw01-team01' in org 'ghclass-demo'.  
## Created team 'hw01-team02' in org 'ghclass-demo'.  
## Created team 'hw01-team03' in org 'ghclass-demo'.  
## Added 'ghclass-anya' to team 'hw01-team01'.  
## Added 'ghclass-bruno' to team 'hw01-team01'.  
## Added 'ghclass-celine' to team 'hw01-team02'.  
## Added 'ghclass-diego' to team 'hw01-team02'.  
## Added 'ghclass-elijah' to team 'hw01-team03'.  
## Added 'ghclass-francis' to team 'hw01-team03'.  
## Added team 'hw01-team01' to repo 'ghclass-demo/hw01-team01'.  
## Added team 'hw01-team02' to repo 'ghclass-demo/hw01-team02'.  
## Added team 'hw01-team03' to repo 'ghclass-demo/hw01-team03'.  
## Cloned 'Sta323-Sp19/hw1'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team01'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team01'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team02'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team02'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team03'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team03'.  
  
## Removed local copy of 'Sta323-Sp19/hw1'
```



ghclass-demo

 **Repositories** 9

 Packages

 People 9

 Teams 3

 Projects

 Settings

Type: All ▾

Language: All ▾

Customize pins

 New

3 results for repositories matching **hw01**

 Clear filter

hw01-team03 Private

 R  0  0  0  0 Updated 1 minute ago

hw01-team01 Private

 R  0  0  0  1 Updated 1 minute ago

hw01-team02 Private

 R  0  0  0  0 Updated 1 minute ago

Top languages

 R

People

9 >



0 seats left — [Buy more](#)

```
team_create("ghclass-demo", team = roster$hw01)
```

```
## Created team 'hw01-team01' in org 'ghclass-demo'.  
## Created team 'hw01-team02' in org 'ghclass-demo'.  
## Created team 'hw01-team03' in org 'ghclass-demo'.
```

```
team_invite("ghclass-demo", user = roster$github, team = roster$hw01)
```

```
## Added 'ghclass-anya' to team 'hw01-team01'.  
## Added 'ghclass-bruno' to team 'hw01-team01'.  
## Added 'ghclass-celine' to team 'hw01-team02'.  
## Added 'ghclass-diego' to team 'hw01-team02'.  
## Added 'ghclass-elijah' to team 'hw01-team03'.  
## Added 'ghclass-francis' to team 'hw01-team03'.
```

```
repo_create("ghclass-demo", name = roster$hw01)
```

```
## Created repo 'ghclass-demo/hw01-team01'.  
## Created repo 'ghclass-demo/hw01-team02'.  
## Created repo 'ghclass-demo/hw01-team03'.
```

```
repo_add_team(repo = org_repos("ghclass-demo", filter = "hw01-"),  
              team = org_teams("ghclass-demo", filter = "hw01-"))
```

```
## Added team 'hw01-team01' to repo 'ghclass-demo/hw01-team01'.  
## Added team 'hw01-team02' to repo 'ghclass-demo/hw01-team02'.  
## Added team 'hw01-team03' to repo 'ghclass-demo/hw01-team03'.
```

```
repo_mirror(source_repo = "Sta323-Sp19/hw1",  
            target_repo = org_repos("ghclass-demo", filter = "hw01-"))
```

```
## Cloned 'Sta323-Sp19/hw1'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team01'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team02'.  
## Pushed (mirror) 'hw1' to repo 'ghclass-demo/hw01-team03'.  
## Removed local copy of 'Sta323-Sp19/hw1'
```

Individual Assignment

```
org_create_assignment(org = "ghclass-demo", repo = paste0("mid1-", roster$github),  
                      user = roster$github, source_repo = "Sta323-Sp19/midterm1")
```

```
## Created repo 'ghclass-demo/mid1-ghclass-anya'.  
## Created repo 'ghclass-demo/mid1-ghclass-bruno'.  
## Created repo 'ghclass-demo/mid1-ghclass-celine'.  
## Created repo 'ghclass-demo/mid1-ghclass-diego'.  
## Created repo 'ghclass-demo/mid1-ghclass-elijah'.  
## Created repo 'ghclass-demo/mid1-ghclass-francis'.  
## Added user 'ghclass-anya' to repo 'ghclass-demo/mid1-ghclass-anya'.  
## Added user 'ghclass-bruno' to repo 'ghclass-demo/mid1-ghclass-bruno'.  
## Added user 'ghclass-celine' to repo 'ghclass-demo/mid1-ghclass-celine'.  
## Added user 'ghclass-diego' to repo 'ghclass-demo/mid1-ghclass-diego'.  
## Added user 'ghclass-elijah' to repo 'ghclass-demo/mid1-ghclass-elijah'.  
## Added user 'ghclass-francis' to repo 'ghclass-demo/mid1-ghclass-francis'.  
## Cloned 'Sta323-Sp19/midterm1'.  
## Pushed (mirror) 'midterm1' to repo 'ghclass-demo/mid1-ghclass-anya'.  
## Pushed (mirror) 'midterm1' to repo 'ghclass-demo/mid1-ghclass-bruno'.  
## Pushed (mirror) 'midterm1' to repo 'ghclass-demo/mid1-ghclass-celine'.  
## Pushed (mirror) 'midterm1' to repo 'ghclass-demo/mid1-ghclass-diego'.  
## Pushed (mirror) 'midterm1' to repo 'ghclass-demo/mid1-ghclass-elijah'.  
## Pushed (mirror) 'midterm1' to repo 'ghclass-demo/mid1-ghclass-francis'.  
## Removed local copy of 'Sta323-Sp19/midterm1'
```




ghclass-demo

Repositories 9

Packages

People 9

Teams 3

Projects

Settings

Type: All ▾

Language: All ▾

[Customize pins](#)

New

6 results for repositories matching **mid1**

Clear filter

mid1-ghclass-anya Private

0 0 0 0 Updated 3 minutes ago

mid1-ghclass-diego Private

0 0 0 0 Updated 3 minutes ago

mid1-ghclass-francis Private

0 0 0 0 Updated 3 minutes ago

mid1-ghclass-bruno Private

0 0 0 0 Updated 3 minutes ago

Top languages

R

People

9 >



0 seats left — [Buy more](#)

What about GitHub Classroom?

GitHub Classroom

GitHub Education

ghclass-demo


ghclass-demo

00

Assignments


Settings

New assignment



Individual assignment
Each participant works individually on their own repository.

Create an individual assignment



Group assignment
Participants form teams that work together on a shared repository.

Create a group assignment

Making Changes

```
repo_add_file(repo = org_repos("ghclass-demo", "hw01-"),  
              file = "files/fizzbuzz.png")
```

```
## ✖ Failed to add file 'fizzbuzz.png' to repo 'ghclass-demo/hw01-team01': already exists.  
##   If you want to force-add this file, re-run the command with `overwrite = TRUE`.  
## ✖ Failed to add file 'fizzbuzz.png' to repo 'ghclass-demo/hw01-team02': already exists.  
##   If you want to force-add this file, re-run the command with `overwrite = TRUE`.  
## ✖ Failed to add file 'fizzbuzz.png' to repo 'ghclass-demo/hw01-team03': already exists.  
##   If you want to force-add this file, re-run the command with `overwrite = TRUE`.
```

```
repo_add_file(repo = org_repos("ghclass-demo", "hw01-"),  
              file = "files/fizzbuzz.png", overwrite = TRUE)
```

```
##   Added file 'fizzbuzz.png' to repo 'ghclass-demo/hw01-team01'.  
##   Added file 'fizzbuzz.png' to repo 'ghclass-demo/hw01-team02'.  
##   Added file 'fizzbuzz.png' to repo 'ghclass-demo/hw01-team03'.
```

Sta 323 - Homework 1

Due by 11:59 pm on Thursday 1/24/2019.

**FIZZ
BUZZ
FIZZBUZZ**

Background

The FizzBuzz test is a common programming interview language that they claim experience in.

The problem statement is as follows:

"Write a program that given a list of numbers as input, for each number, if the number is divisible by three prints "Fizz" instead of the number and for the numbers that are divisible by both three and five prints "FizzBuzz"."



Sta 323 - Homework 1

Due by 11:59 pm on Thursday 1/24/2019.

FIZZ
BUZZ

Background

The FizzBuzz test is a common programming interview language that they claim experience in.

The problem statement is as follows:

"Write a program that given a list of numbers as input, for each number, if the number is divisible by three prints "Fizz" instead of the number and for the numbers that are divisible by both three and five prints "FizzBuzz"."

Modify a file

```
repo_modify_file(repo = org_repos("ghclass-demo", "hw01-"), file = "README.md",  
                  pattern = "on Thursday 1/24/2019.", content = "on Wednesday 10/07/2019.")
```

```
## Modified file 'ghclass-demo/hw01-team01/README.md'.  
## Modified file 'ghclass-demo/hw01-team02/README.md'.  
## Modified file 'ghclass-demo/hw01-team03/README.md'.
```

Collect student work

```
local_repo_clone(repo = org_repos("ghclass-demo", "mid1-"), local_path = "mid1")
```

```
## Cloned 'ghclass-demo/mid1-ghclass-anya'.  
## Cloned 'ghclass-demo/mid1-ghclass-bruno'.  
## Cloned 'ghclass-demo/mid1-ghclass-celine'.  
## Cloned 'ghclass-demo/mid1-ghclass-diego'.  
## Cloned 'ghclass-demo/mid1-ghclass-elijah'.  
## Cloned 'ghclass-demo/mid1-ghclass-francis'.
```

Organize student work

```
local_repo_rename(repo_dir = "mid1", pattern = roster$github,  
                  replacement = paste0(roster$netid, "-(\\1)"))
```



```
## Renaming 'mid1/mid1-ghclass-anya' to 'mid1/mid1-za17-(ghclass-anya)'.  
## Renaming 'mid1/mid1-ghclass-bruno' to 'mid1/mid1-kb34-(ghclass-bruno)'.  
## Renaming 'mid1/mid1-ghclass-celine' to 'mid1/mid1-ac13-(ghclass-celine)'.  
## Renaming 'mid1/mid1-ghclass-diego' to 'mid1/mid1-bd88-(ghclass-diego)'.  
## Renaming 'mid1/mid1-ghclass-elijah' to 'mid1/mid1-se01-(ghclass-elijah)'.  
## Renaming 'mid1/mid1-ghclass-francis' to 'mid1/mid1-df00-(ghclass-francis)'.
```





Feedback?


```
repo_style("ghclass-demo/hw01-team01", files = "*.Rmd", draft = TRUE)
```



```
## Created branch 'styler' from 'ghclass-demo/hw01-team01'.  
## Cloned 'ghclass-demo/hw01-team01@styler'.  
## Created pull request for 'ghclass-demo/hw01-team01 (master <= styler)'.
```

styler revisions #4

 **Draft** rundel wants to merge 1 commit into `master` from `styler` 

 Conversation **0**  Commits **1**  Checks **0**  Files changed **1**






rundel commented 15 seconds ago  

This pull request contains the results of running the automated R code formatting tool `styler` on your repo. Styling is based on the [tidyverse R style guide](#).

Click on the commit below to see details of recommended changes. It is not necessary that your code cleanly pass these checks, but if there is a large number of significant changes suggested you should review the style guide with an eye towards potentially improving your code formatting.

[@ghclass-anya](#), [@ghclass-bruno](#), [@ghclass-diego](#), [@ghclass-elijah](#), [@ghclass-francis](#),
[@ghclass-celine](#)

  Results of running styler:  2f8eadd

28 hw1.Rmd

@@ -16,32 +16,32 @@ seek help from StackOverflow in finding a way to test for integers, linked here:

```
16
17
18 ```{r}
19 -fizzbuzz = function(v) {
20 -   for (i in v){ #iterates through the values defined in v
21 -
22 -     #Error cases
23 -     if ((is.integer(i) == FALSE) & (is.double(i) == FALSE)){
24       stop("Value is non-numeric")
25     }
26 -     else if ((i <= 0) || (i == Inf)){
27       stop("Value is not in the acceptable range")
28     }
29 -     else if (i%%1 != 0){
30       stop("Value is not an integer")
31     }
32 -
33 -
34 -     #Constructing working cases options
35 -     else if ((i%%3 == 0) & (i%%5 == 0)){
36       print("FizzBuzz")
37     }
38 -     else if (i%%3 == 0){
39       print("Fizz")
40     }
41 -     else if (i%%5 == 0){
42       print("Buzz")
43     }
44   }
45 }
```

```
16
17
18 ```{r}
19 +fizzbuzz <- function(v) {
20 +   for (i in v){ # iterates through the values defined in v
21 +
22 +     #Error cases
23 +     if ((is.integer(i) == FALSE) & (is.double(i) == FALSE)){
24       stop("Value is non-numeric")
25     }
26 +     else if ((i <= 0) || (i == Inf)){
27       stop("Value is not in the acceptable range")
28     }
29 +     else if (i %% 1 != 0){
30       stop("Value is not an integer")
31     }
32 +
33 +
34 +     #Constructing working cases options
35 +     else if ((i %% 3 == 0) & (i %% 5 == 0)){
36       print("FizzBuzz")
37     }
38 +     else if (i %% 3 == 0){
39       print("Fizz")
40     }
41 +     else if (i %% 5 == 0){
42       print("Buzz")
43     }
44   }
45 }
```

Future Work

- We will be submitting to CRAN in the next month
- Active summer project adding functionality for peer review by Mine Cetinkaya-Rundel and Therese Anders
- Support for GitHub actions for automated feedback ([rundel/wercker](#) replacement)
- Support more workflows, if you use a GitHub based workflow for teaching that was not reflected here please get in touch.

Thank you!



[rundel/ghclass](#)



bit.ly/JSM2019_ghclass



github.com/rundel



rundel@gmail.com



[@rundel](#)