Introduction to GitHub with R

Nicolas Attalides

Workshop Setup:

- Wi-Fi

Network Name: N/A

Password: N/A

- Resources

R (version 3.6.3) 

RStudio (version 1.3.1073) 

Git (version 2.28.0) 

What is GitHub?

Git is an open source version control system and is free to use!

GitHub is a code hosting platform that offers a user-friendly web-based interface to use Git.

You can work on public or private **repositories** which means that you can collaborate on projects with others from anywhere in the world!

Repository: A storage space where your project files and code live

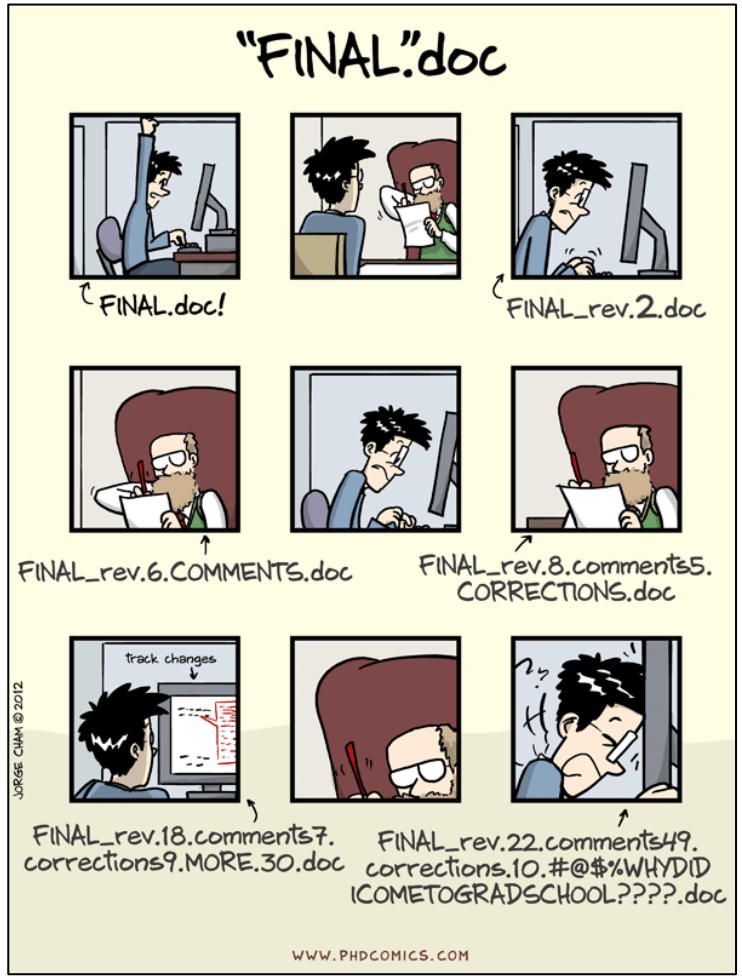
Topics

- Workshop aim:

Learn how to version control an R project using GitHub within Rstudio and the basics in using Git.

- Topics:
  - Install Git
  - Setup a GitHub account
  - Create a GitHub repository
  - Connect repository with R project
  - Basic version control processes

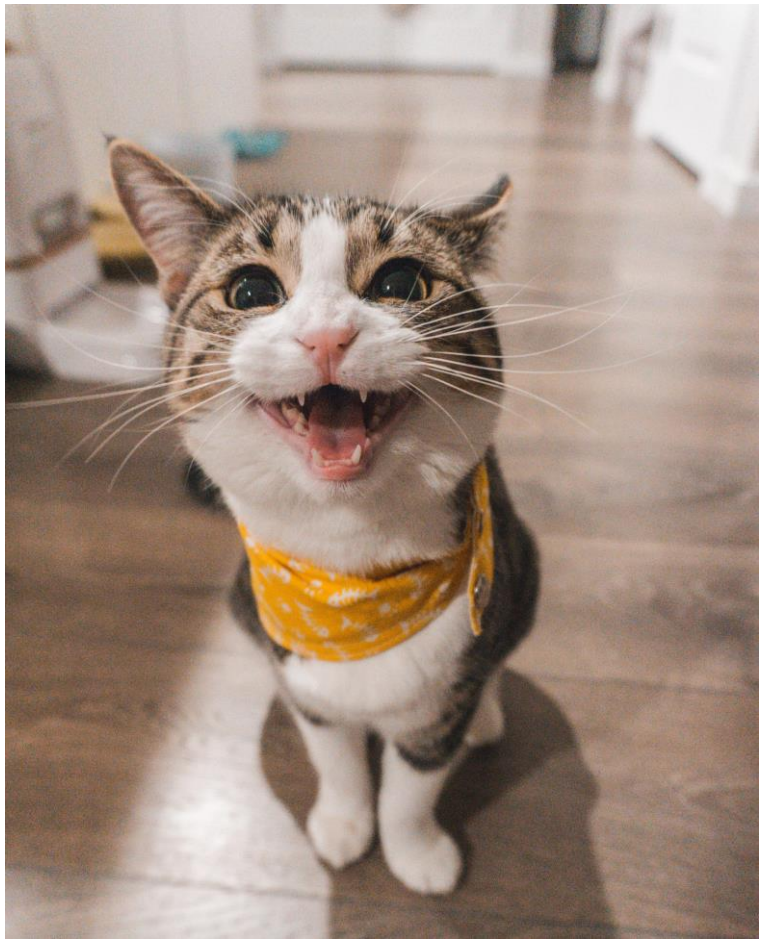
Why version control?



Because I want to...

- have a backup of the code
- see what has changed in the code over time
- be able to roll back my code to a previous version
- collaborate effectively with helpful documentation
- avoid multiple copies or versions

Workshop tasks



For this workshop we will take the step by step approach to exercises. I will cover one step and demonstrate it on my machine and then allow you a few minutes to repeat the step.

This will ensure that everyone is on the same page and troubleshoot early than when it is too late!

Install Git

In order to start using the Git version control system we need to install it on our machine.

To download Git you need to go to: https://git-scm.com/downloads

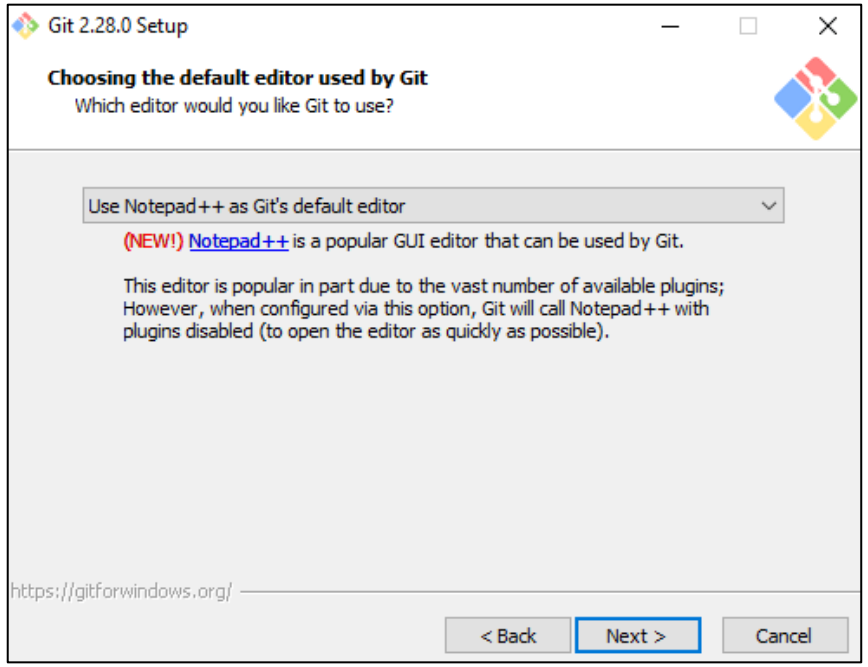
and select your platform.

We then follow the next steps to install Git ...

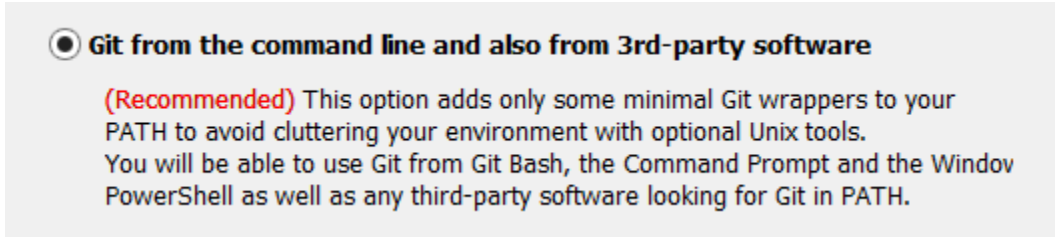
Install Git

Open the executable file that you just downloaded and follow the instructions (by clicking next) to complete the installation.

Install Git



There are several editors to choose from. Notepad++ is a simple editor that can be useful in general to have installed on your machine. However please note that when coding in R we use RStudio to edit our scripts.



Follow the recommended setup and follow the instructions (by clicking next) to complete the installation.

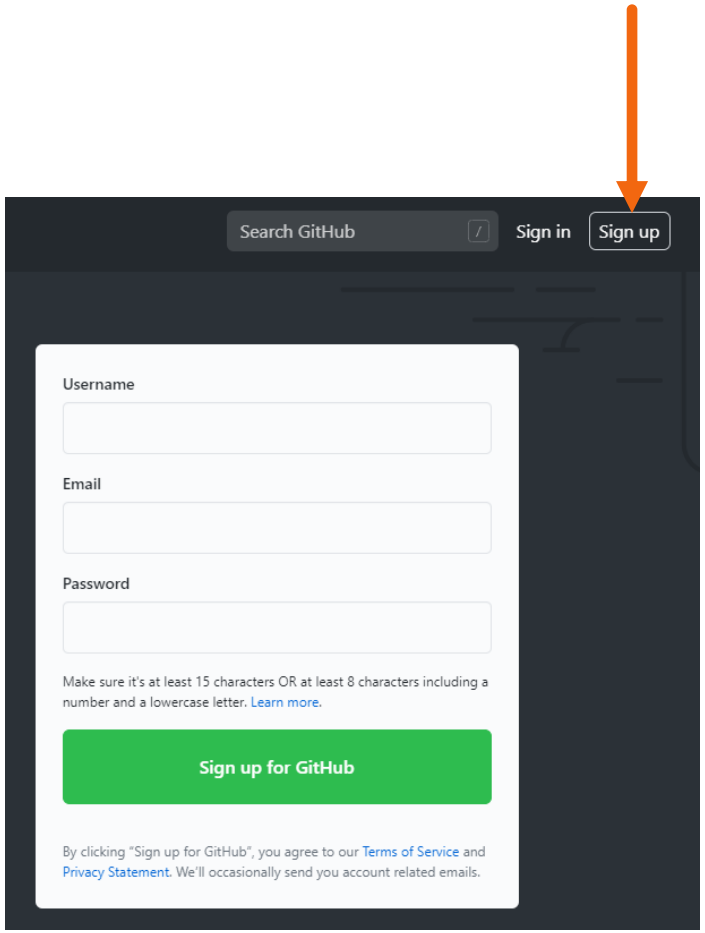
Setup a GitHub account

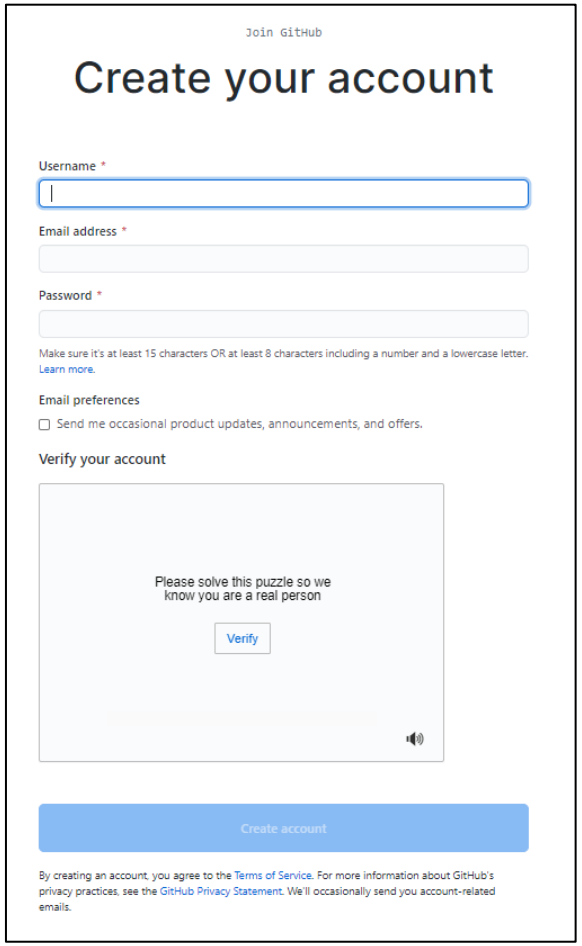
In order to start version controlling your projects online or even start collaborating with others you will need a GitHub account.

- **For this workshop you need a GitHub account.**
- **If you do not have one then you need to create an account at:** https://github.com/

You do not need to download a software, however it's useful to know that there is a GitHub desktop version: https://desktop.github.com/

Setup a GitHub account





It is a good idea to use a username that can easily be associated with you.

For example:

first name initial + last name....

nicolas attalides

nattalides

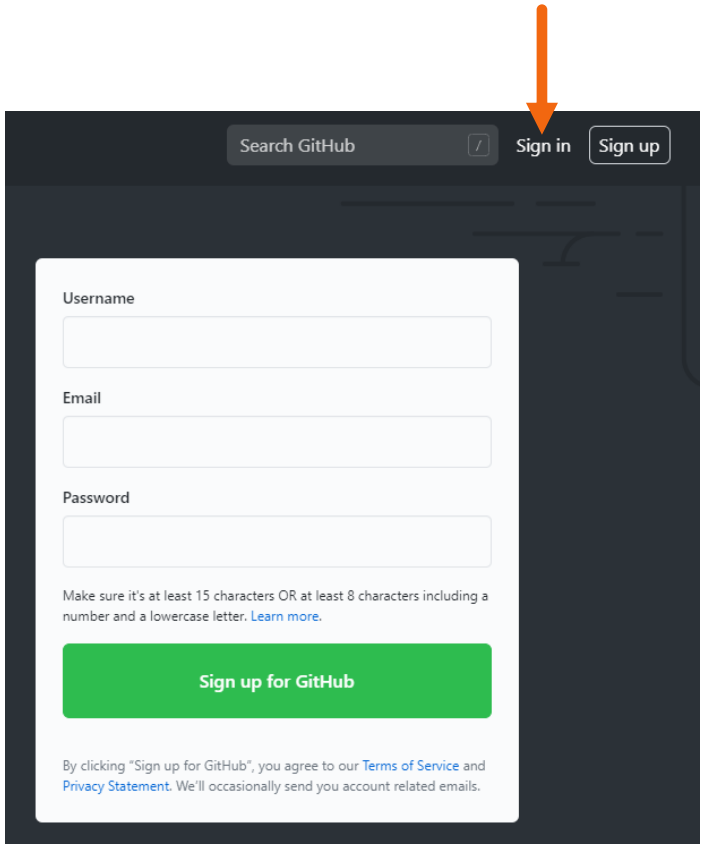
Create a GitHub repository

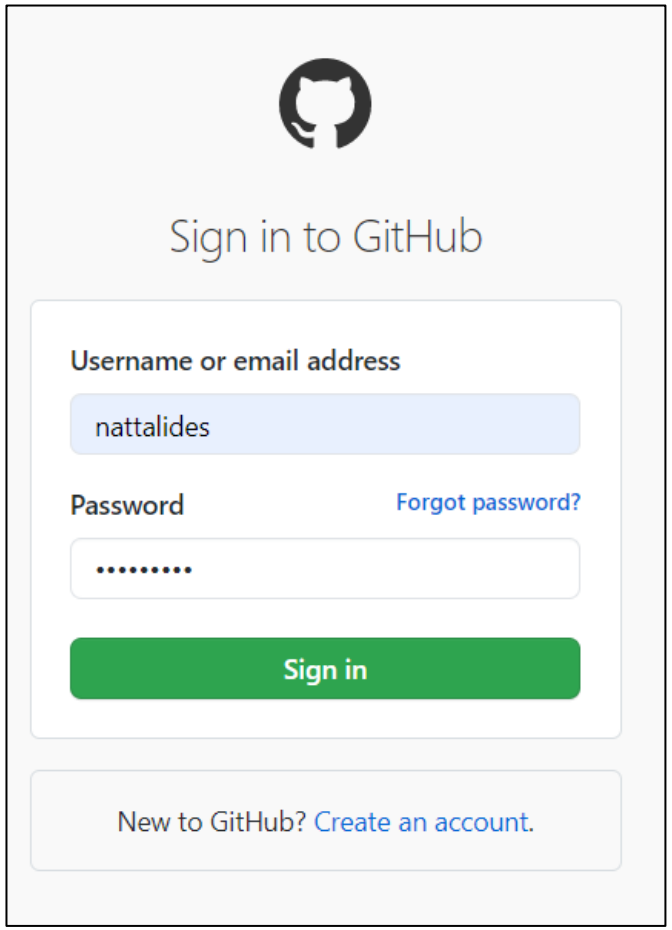
Once we have our GitHub account up and running the next step is to create a new repository. This is the space where your folder and files such R scripts are stored and version controlled. It is good practice for each project that you work on to have its own dedicated repository.

- **Sign in to our GitHub account**
- **Create a new public repository**

You can control who can access your project by creating a **private repository**, you can also convert a public to private and vice versa

Create a GitHub repository



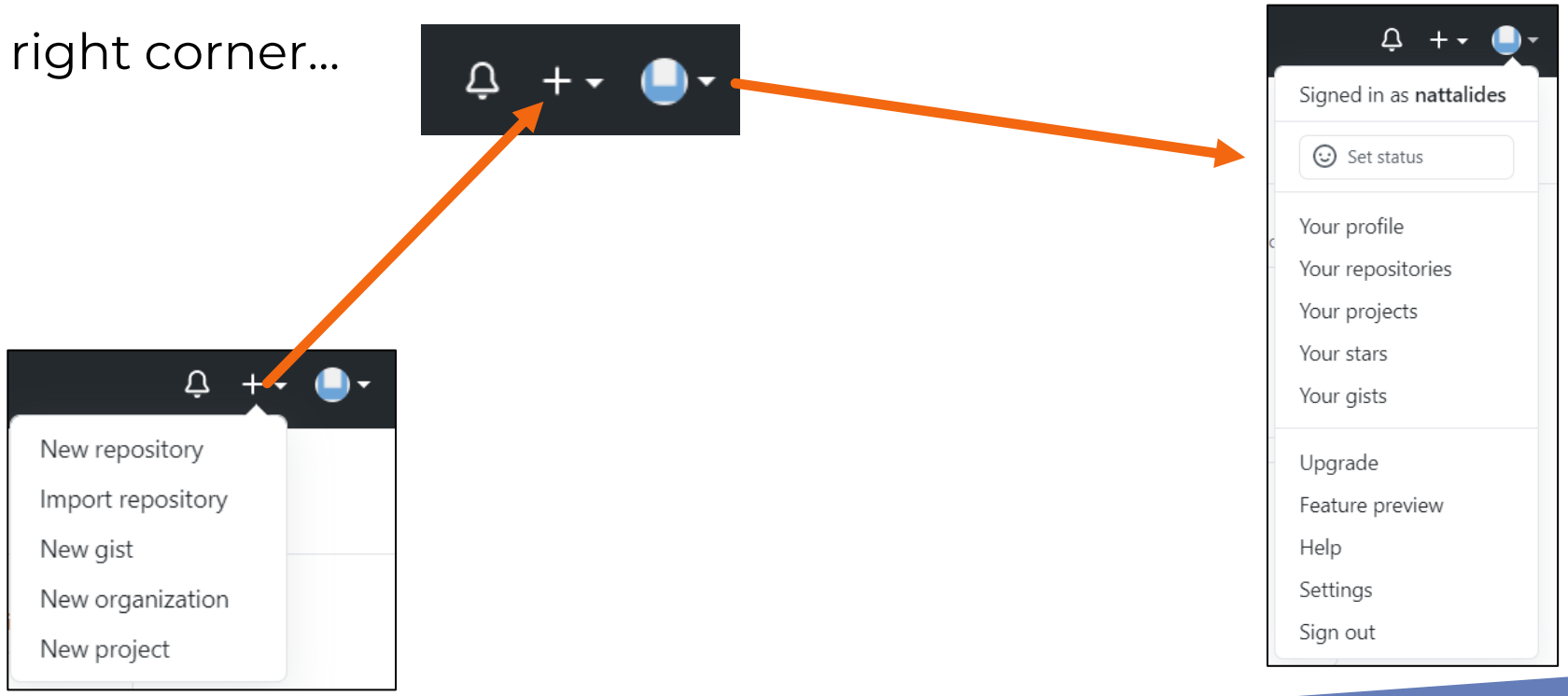


https://github.com/nattalides

This is also the URL that others can go to and see all of my public repositories!

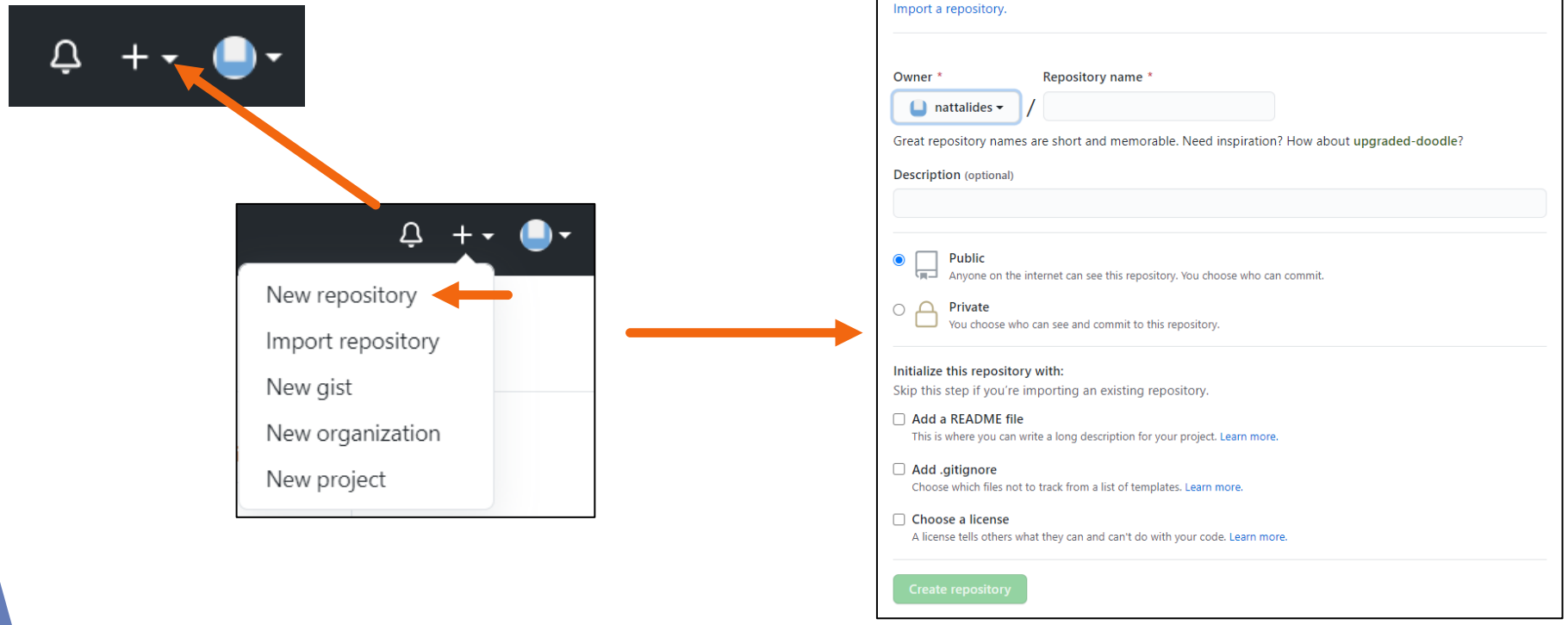
Create a GitHub repository

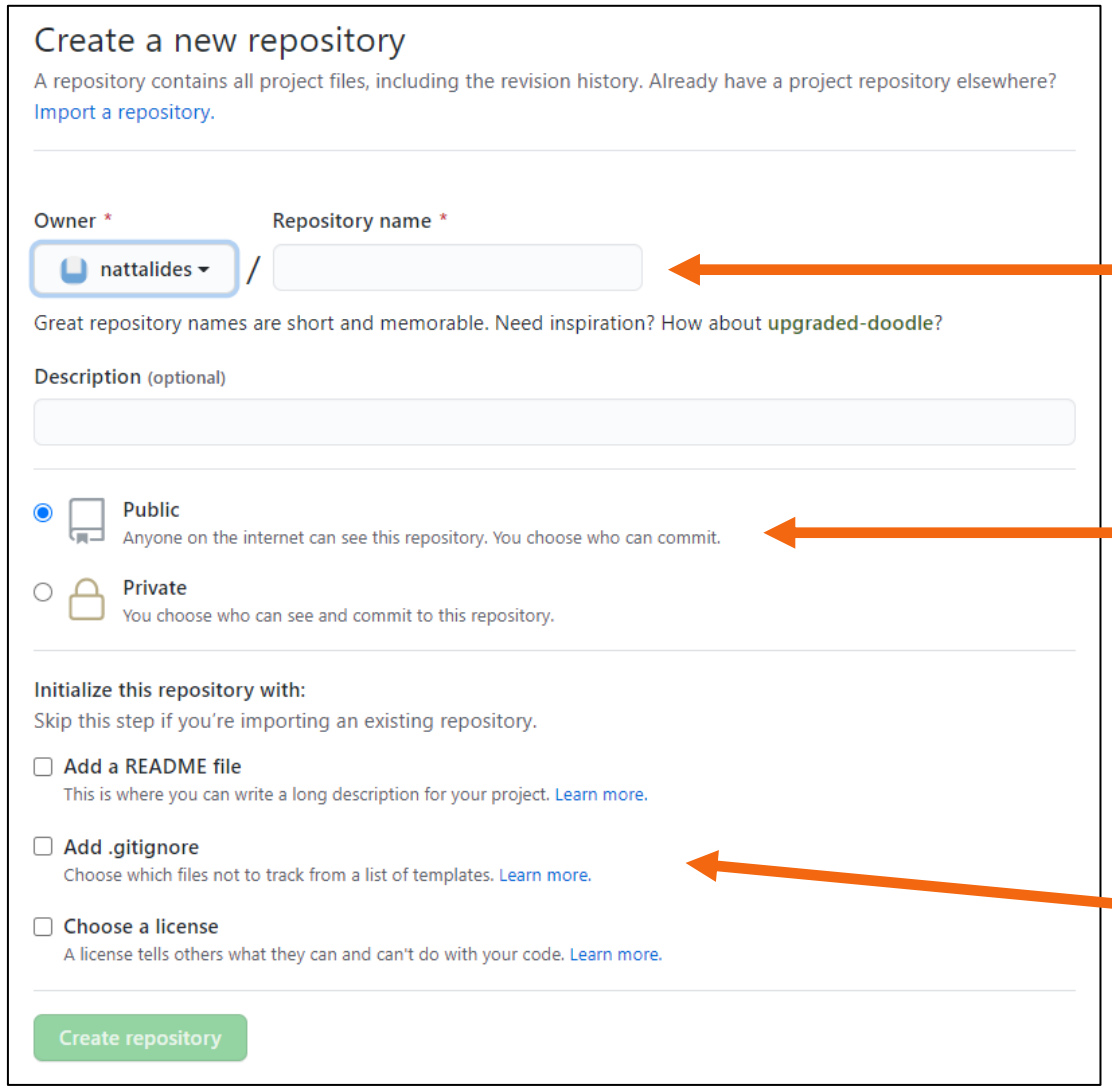
Note: The homepage might look different for each user depending on recent activity or account overview. The important navigator is found on the top right corner...



Create a GitHub repository

Select the “+” symbol that we saw earlier and click on “New repository”.





This is the repository name. This is also the URL address that others can use to go straight into that project.

`e.g. BarcelonaR_workshop_Introduction_to_GitHub_with_R`

Select the repository type, in this workshop we will work with a public repository

It is good practice to add a README file as this is the first thing a new user will get to see/read about your project. In this workshop we leave these options unticked but it is worth coming back to explore these options!

Congratulations! You have just created a GitHub repository!

nattalides / BarcelonaR_workshop_Introduction_to_GitHub_with_R

Code | Issues | Pull requests | Actions | Projects | Wiki | Security | Insights | Settings

Quick setup — if you've done this kind of thing before

Set up in Desktop or HTTPS SSH `git@github.com:nattalides/BarcelonaR_workshop_Introduction_to_GitHub_with_R.git`

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# BarcelonaR_workshop_Introduction_to_GitHub_with_R" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M master
git remote add origin git@github.com:nattalides/BarcelonaR_workshop_Introduction_to_GitHub_with_R.git
git push -u origin master
```

...or push an existing repository from the command line

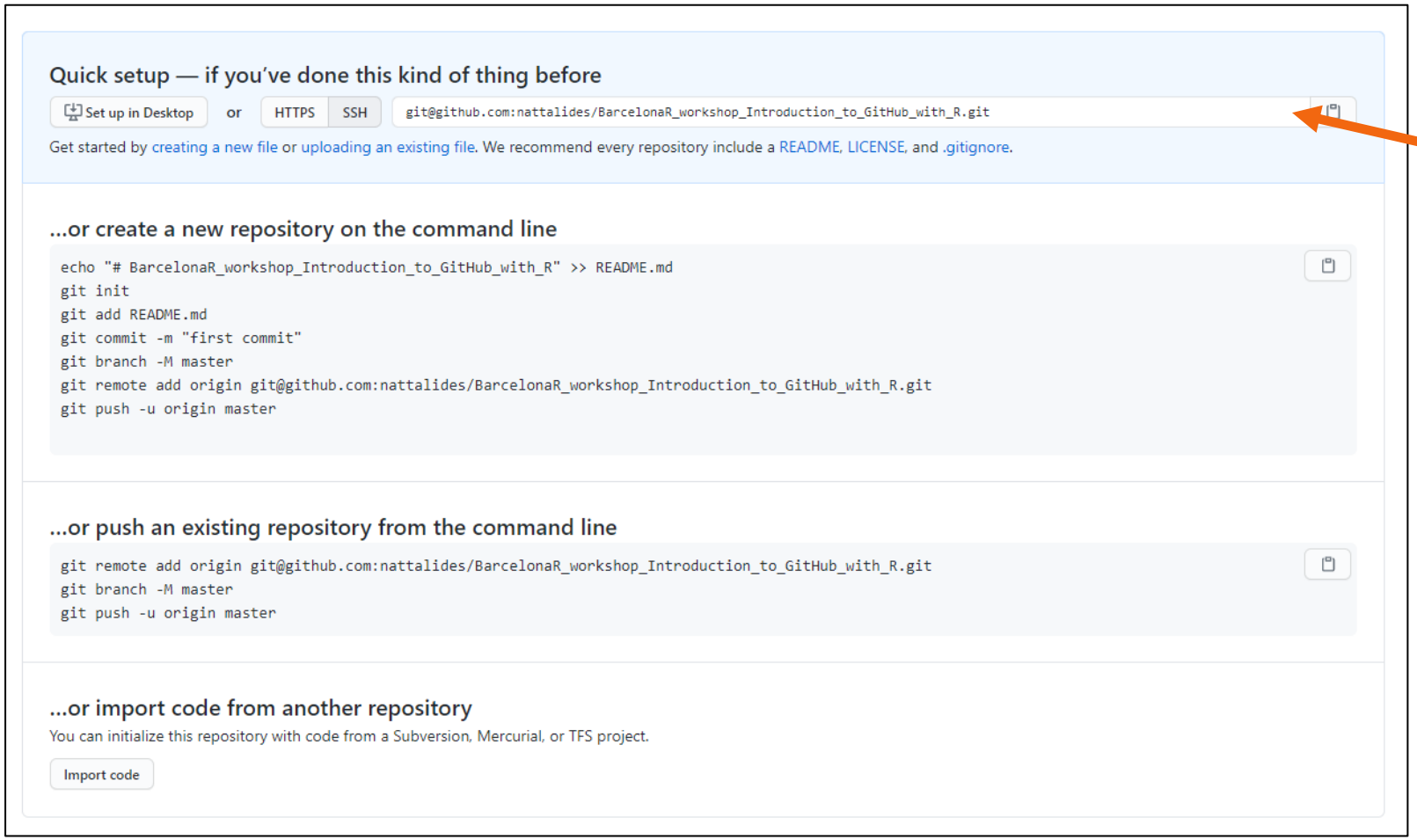
```
git remote add origin git@github.com:nattalides/BarcelonaR_workshop_Introduction_to_GitHub_with_R.git
git branch -M master
git push -u origin master
```

...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

Import code

Create a GitHub repository



This is important...

you will see later on why

Connect repository with R project

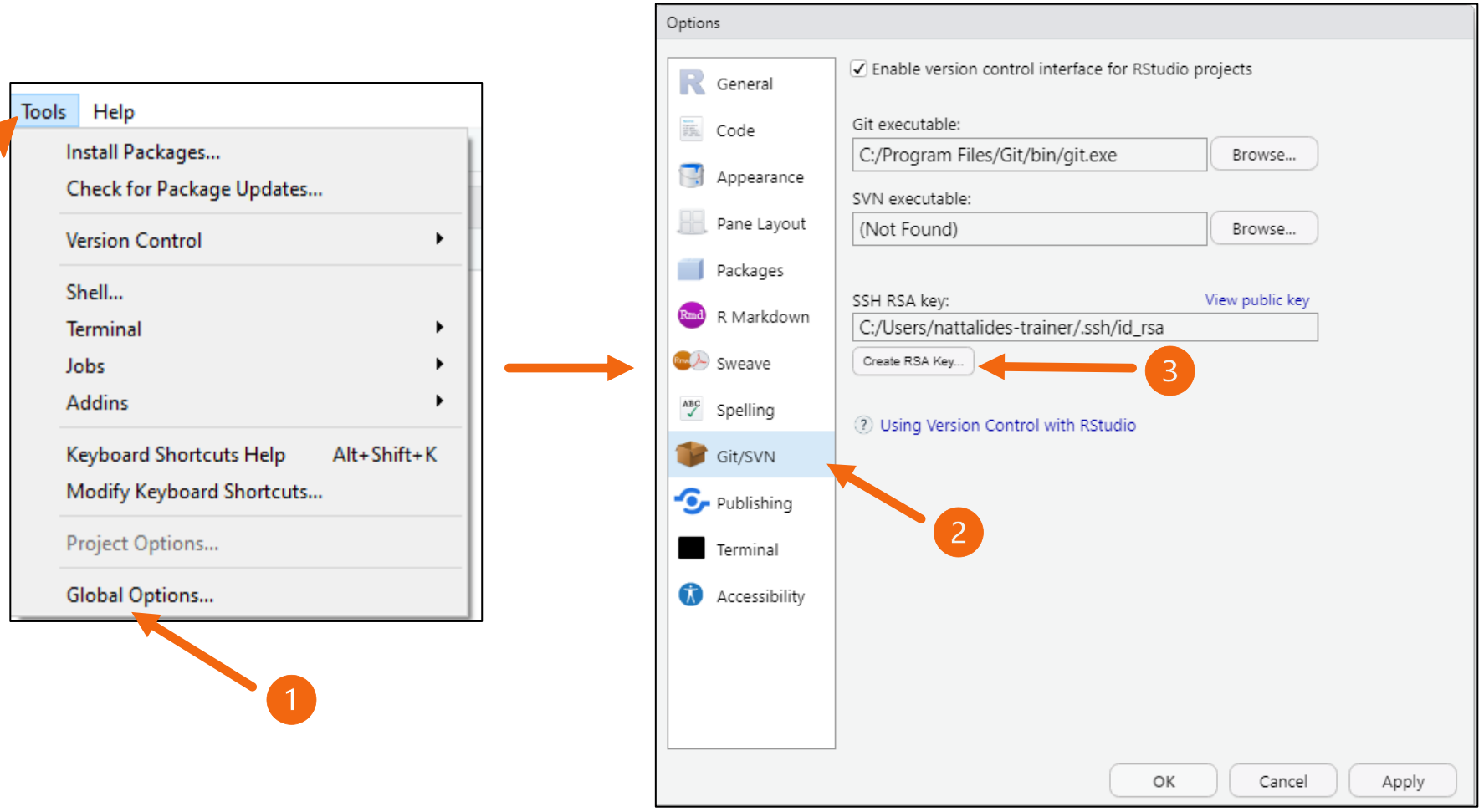
In order to link up our GitHub account with RStudio (desktop) we need to establish a secure connection. This is done by creating and using an **SSH key** and it only needs to be done once.

SSH stands for Secure Shell and is a “cryptographic network protocol for operating network services securely over an unsecured network”.

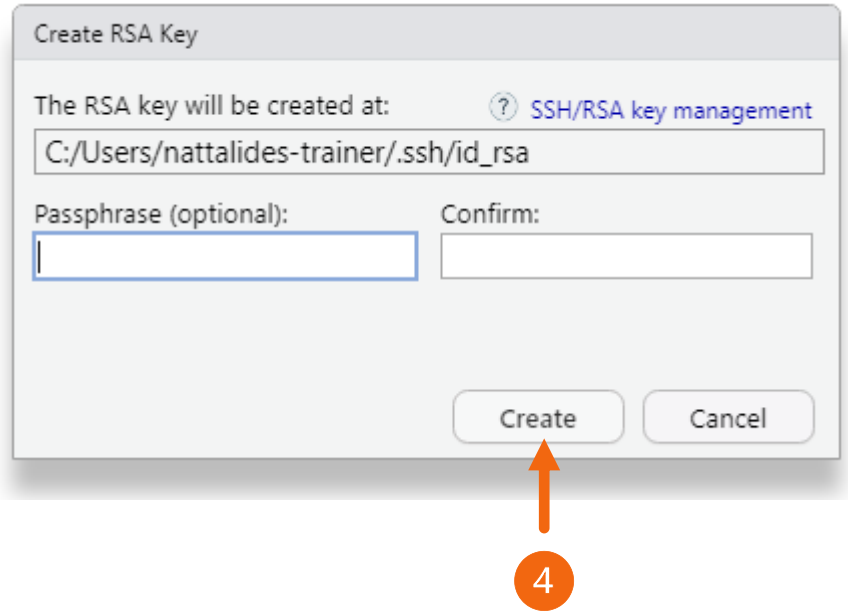
- **Create an SSH key from your RStudio desktop**
- **Associate the SSH key with your GitHub account**
- **Clone a GitHub repository to an R project**

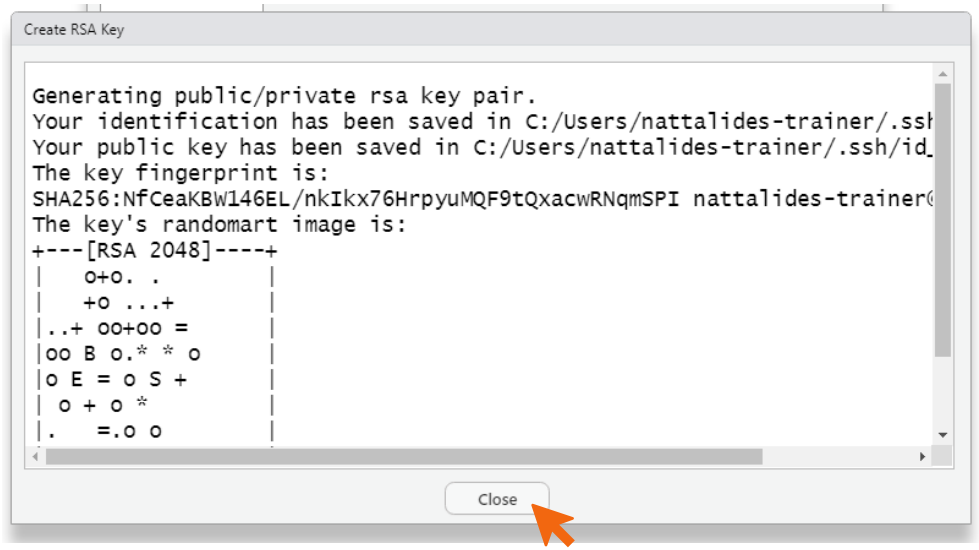
For security **do not** share with others your SSH key

Create an SSH key from your RStudio desktop



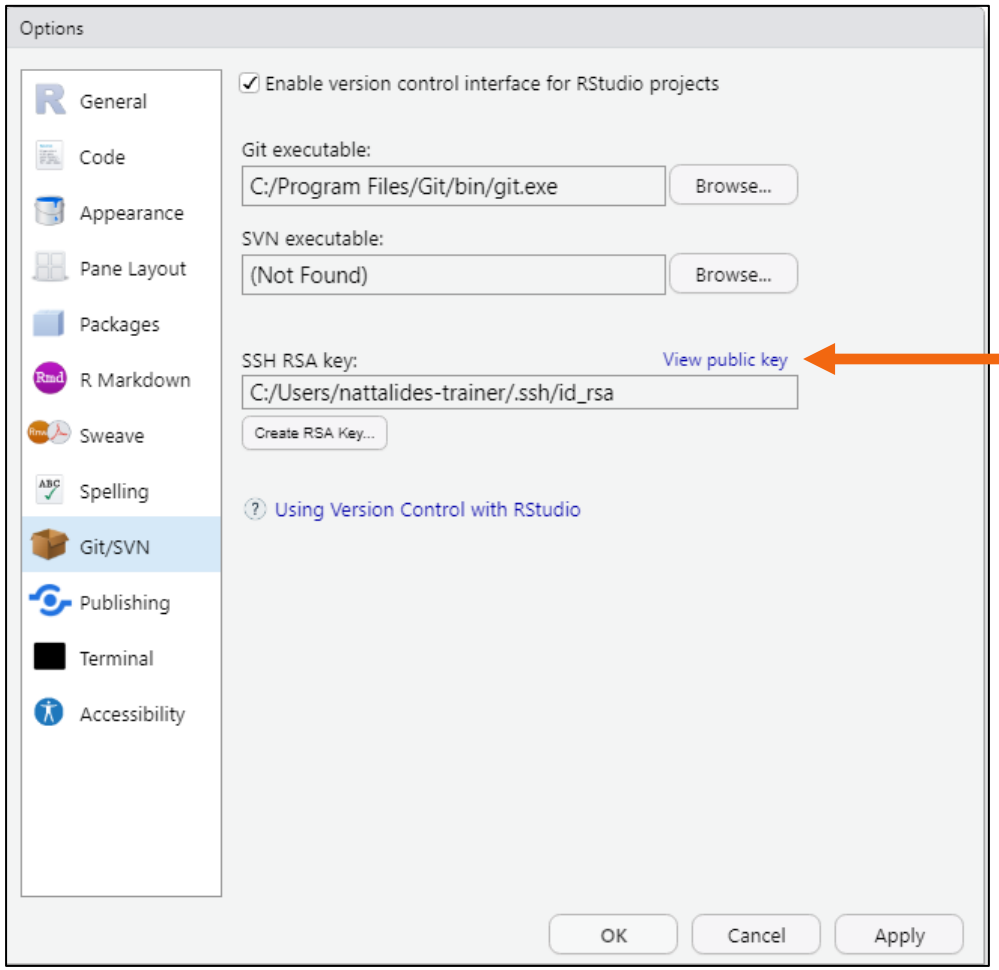
Create an SSH key from your RStudio desktop





A passphrase is like a password that you will be prompted to supply. For simplicity we will leave this blank.

Create an SSH key from your RStudio desktop



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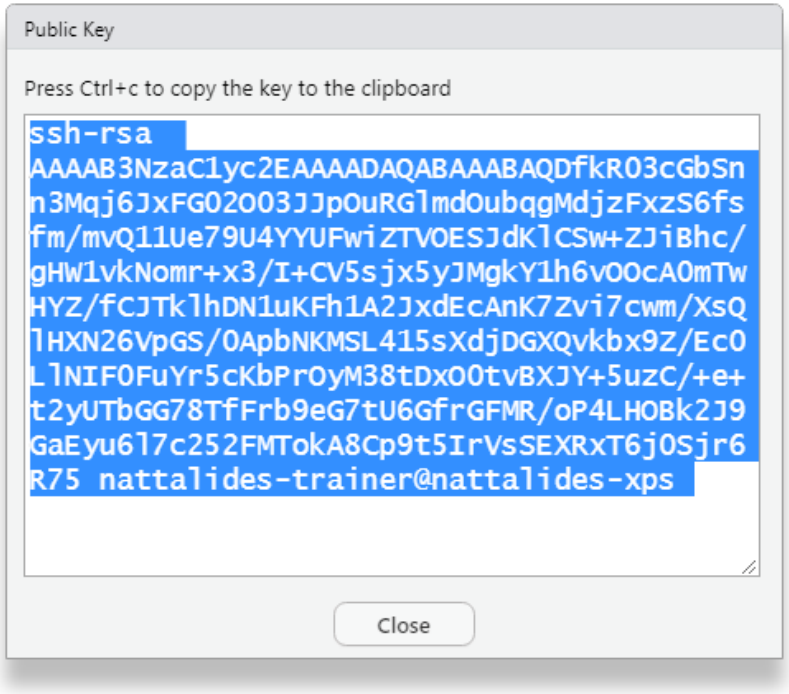
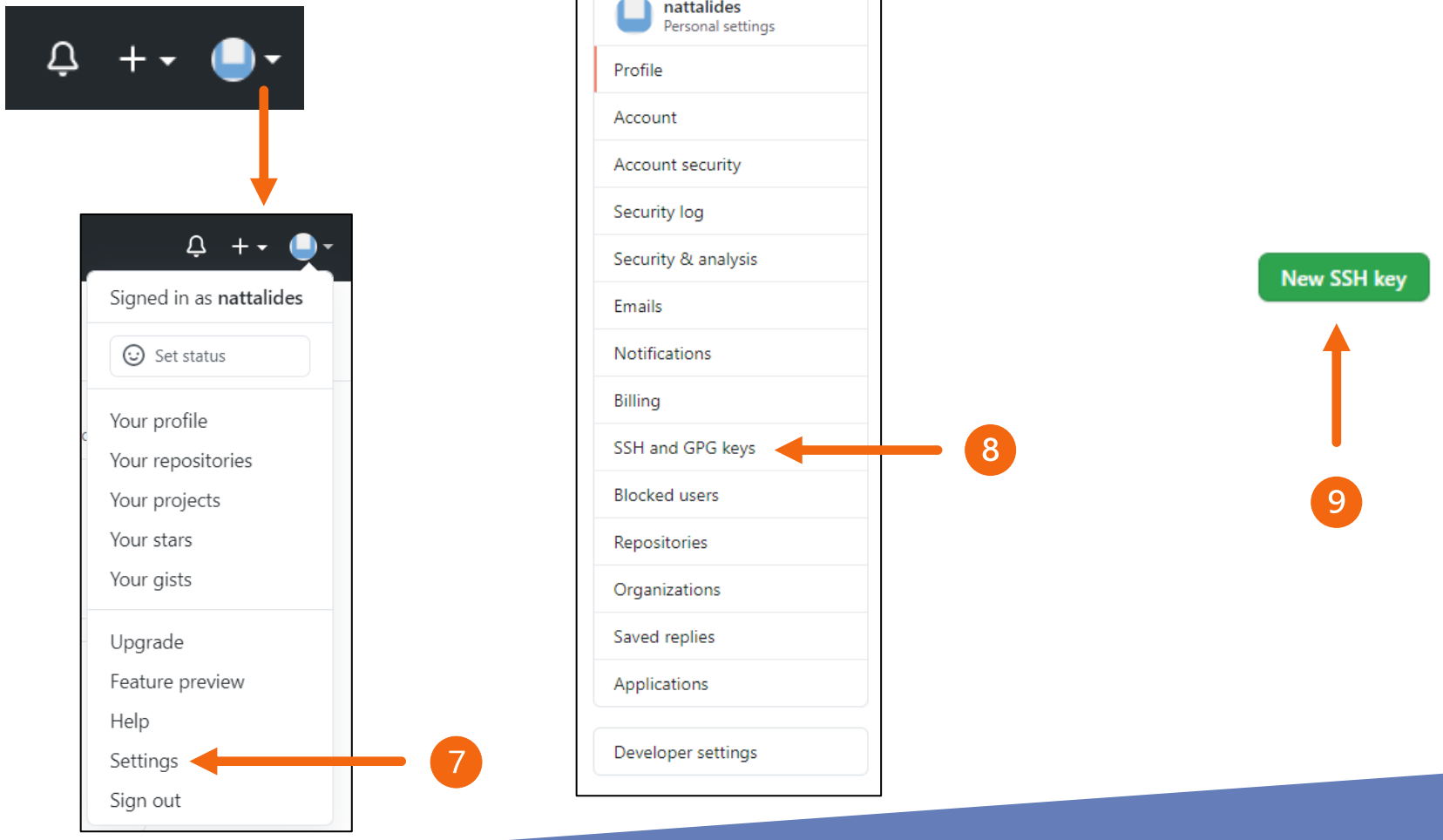
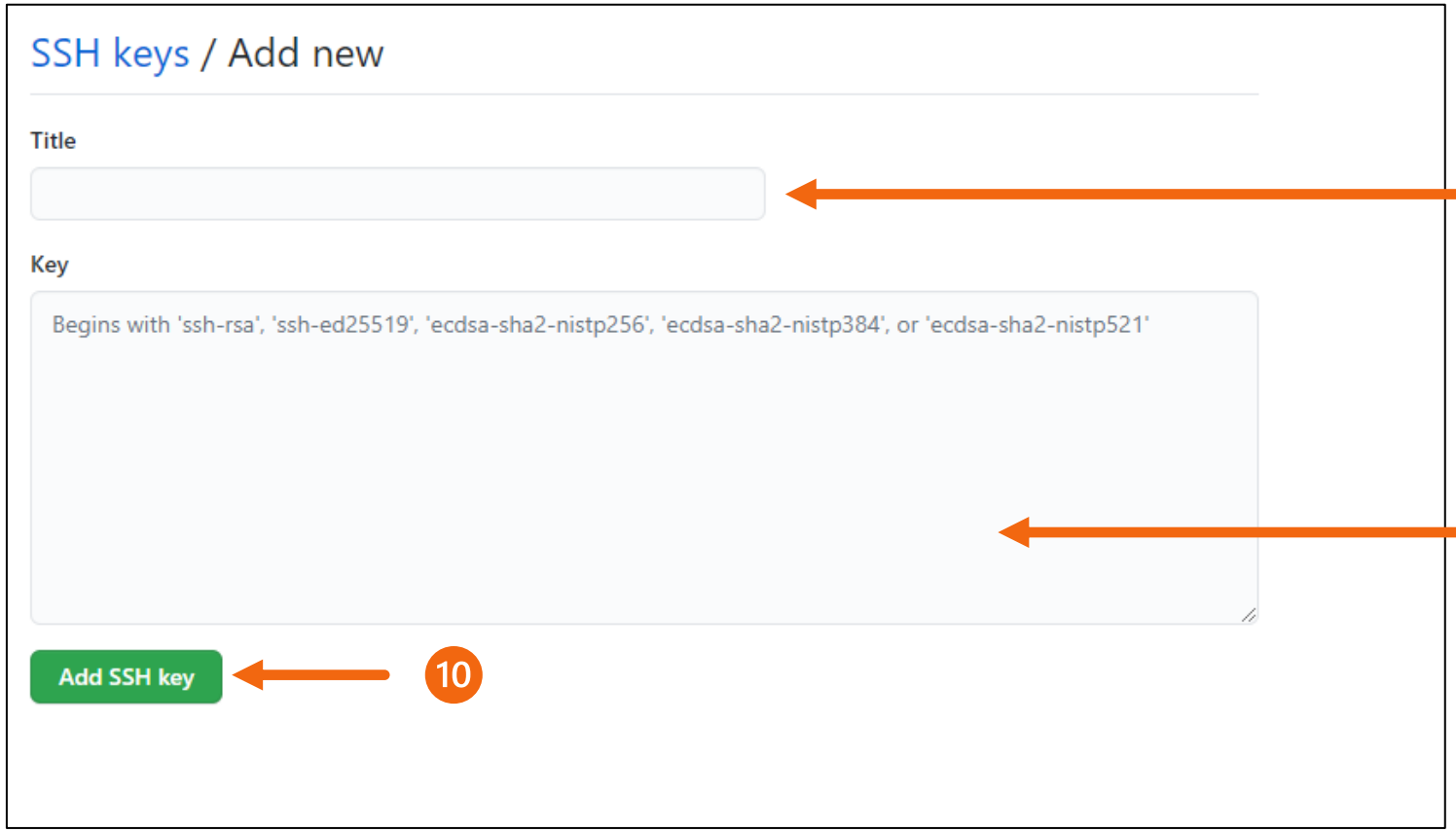


6 Press Ctrl + c to copy the key to the clipboard

Associate the SSH key with your GitHub account



Associate the SSH key with your GitHub account



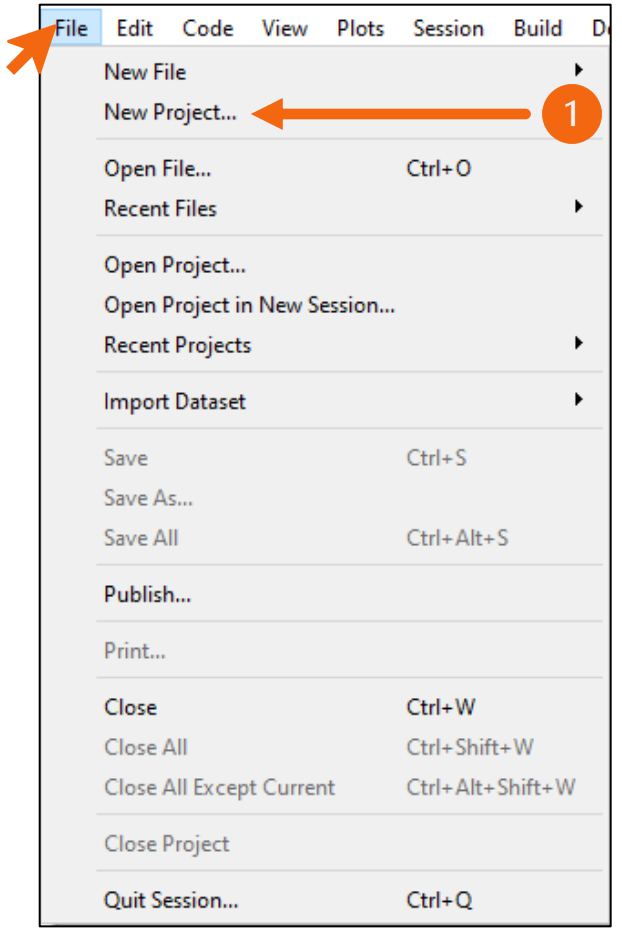
Typically SSH keys are linked to a specific machine, so good practice is to give this key a title to reflect that, for example, “Nicolas-Laptop”

Paste here the SSH key that you copied earlier from RStudio

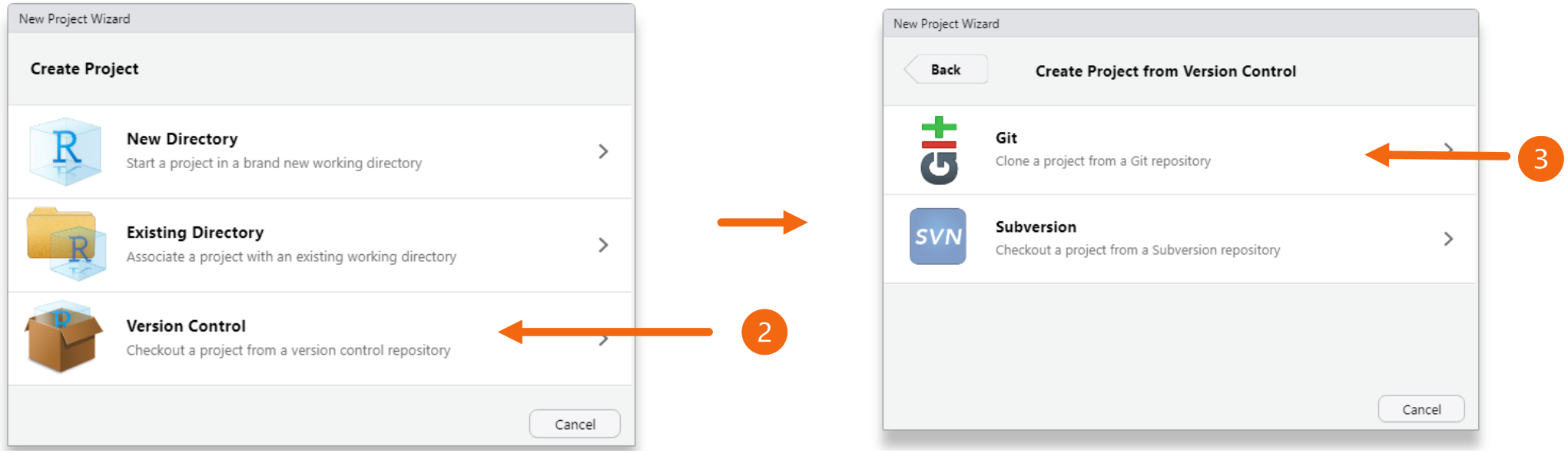
Clone a GitHub repository to an R project

It is a good idea to learn how to write code within R projects. This is because by using R projects you can easily divide your work in a structured way. Each project has its own setup such as a working directory, workspace and history.

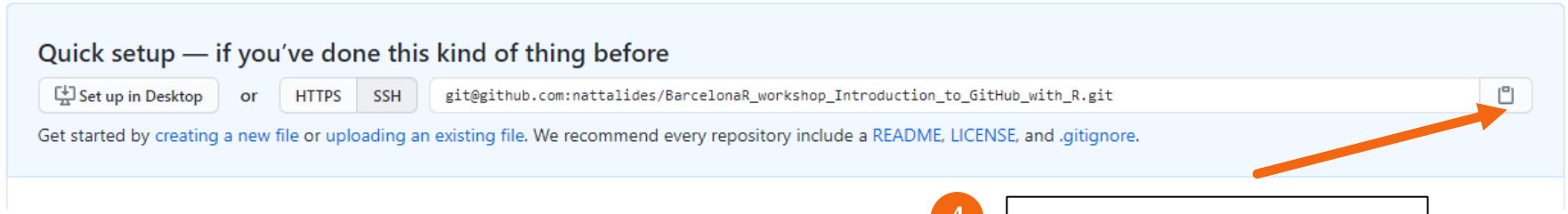
This is even better and more efficient when it is **version controlled**!



Clone a GitHub repository to an R project



Clone a GitHub repository to an R project



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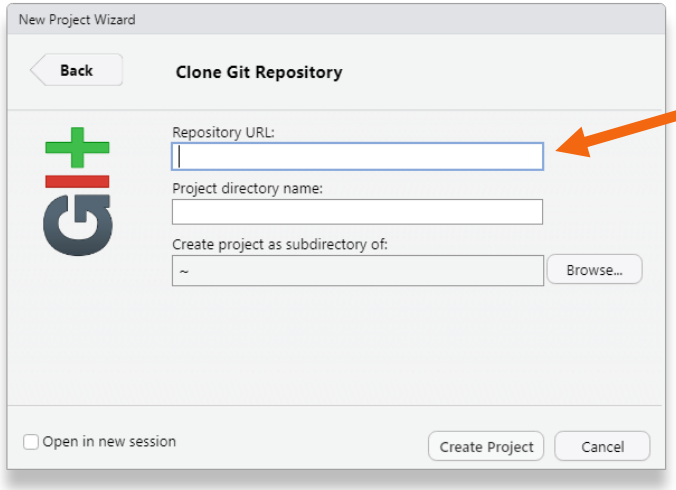
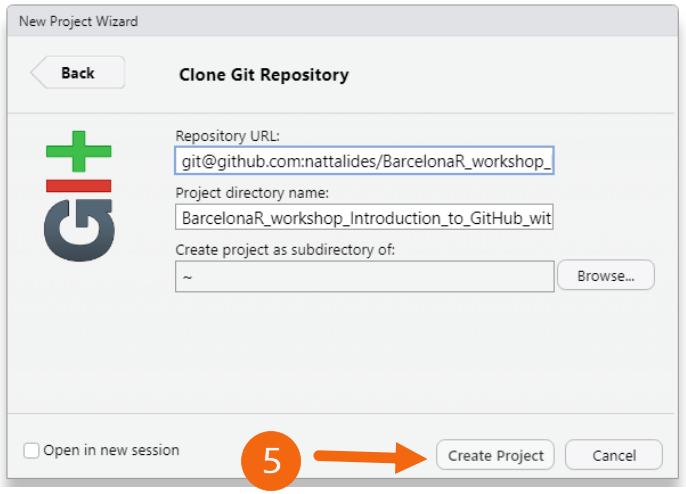
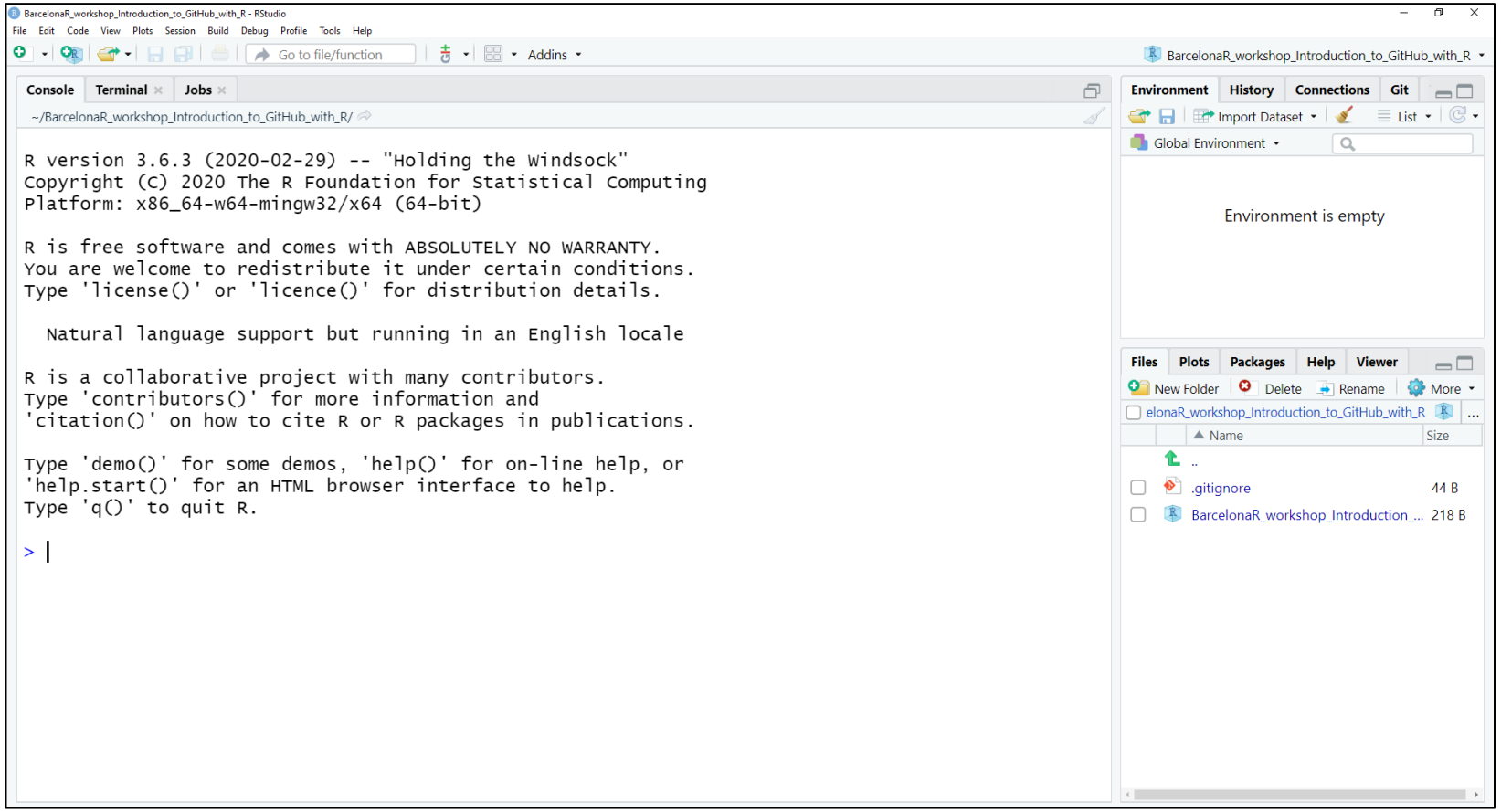
Copy the URL path to clipboard and paste to Repository URL

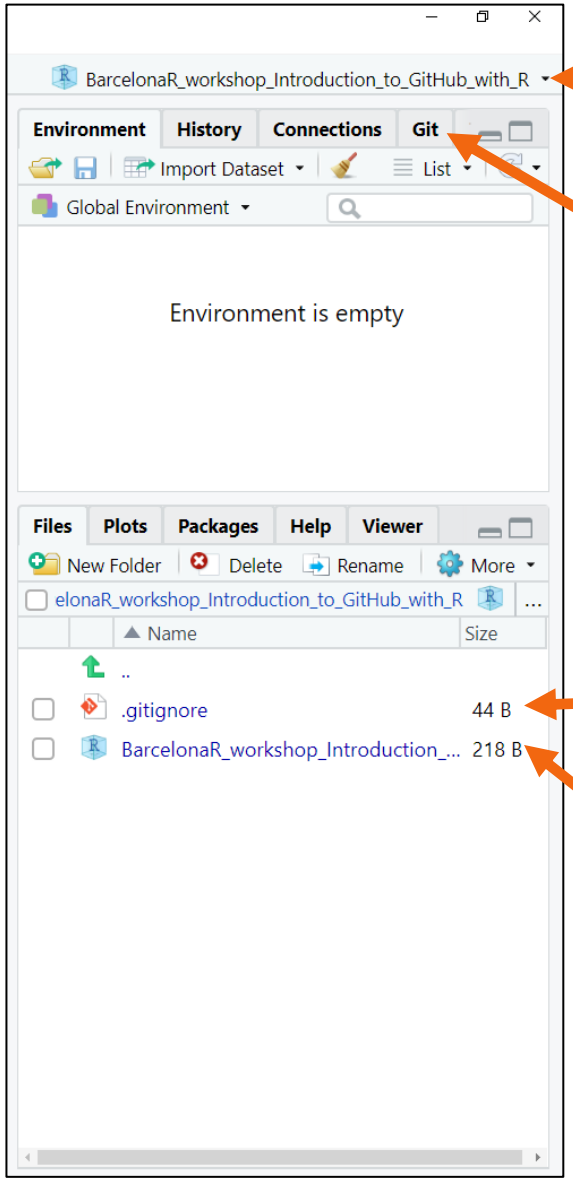




You can edit the project directory name and the folder where it will live on your machine

Congratulations! You have just connected a GitHub repository with an R project!





This tells us that we are now inside the R project: "BarcelonaR_workshop_Introduction_to_GitHub_with_R"

This is the "new" tab that should appear that tells you that your R project has added Git functionality, i.e. it is version controlled. This tab will be very useful as we develop and version control our code!

This is a very useful (hidden) file that communicates to our GitHub repository what files/folders should be **ignored**... these files/folders **will not** be version controlled! More on this later.

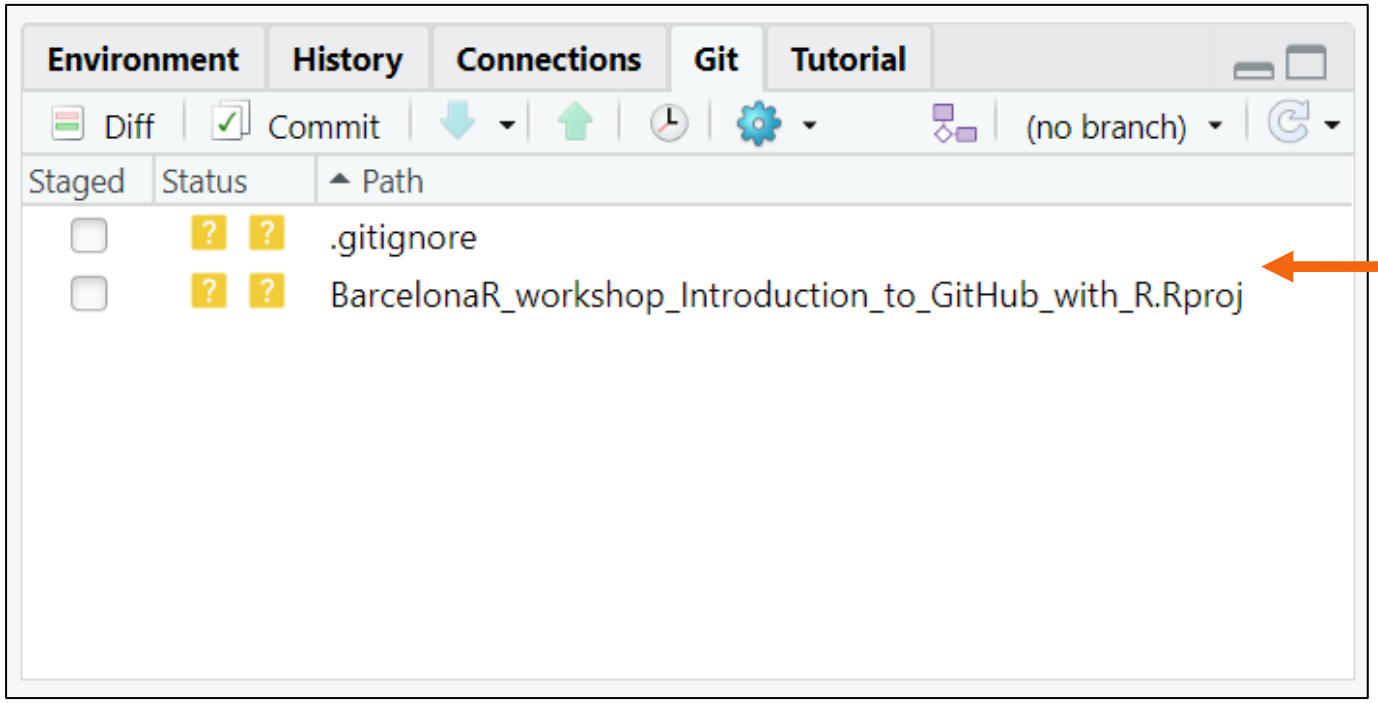
This is the .Rproj file associated with this project

Basic version control processes

Now that our project is version controlled let's cover some of the basic processes to version control a file, keeping things as simple as possible. A file in our repository can be one of four statuses:

1. **Untracked**: The file is not being tracked, i.e. it is not version controlled
2. **Unmodified**: The file is tracked but has not changed
3. **Modified**: The file is tracked and has been changed
4. **Staged**: The file is tracked and the changes are ready to be version controlled

Basic version control processes



These files are currently untracked

Basic version control processes

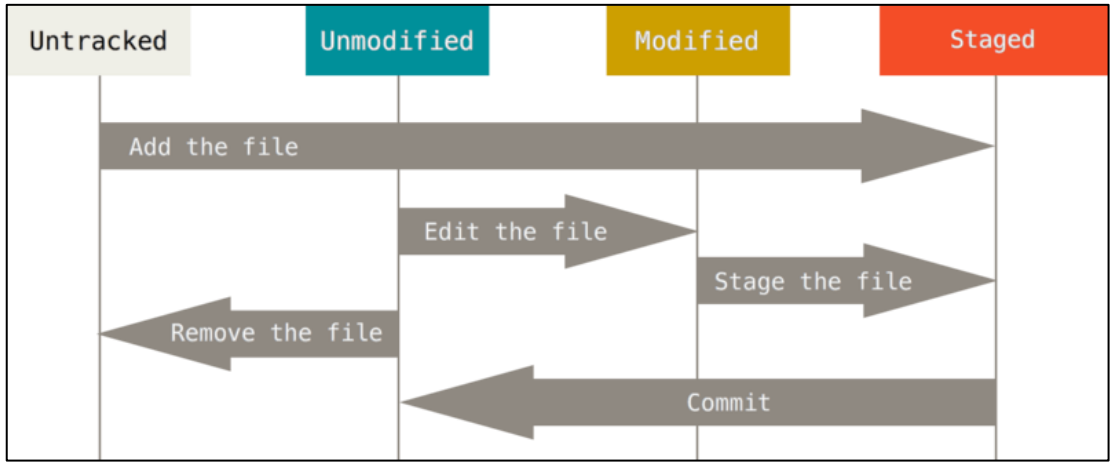


Image from: https://git-scm.com/book/en/v2/Git-Basics-Recording-Changes-to-the-Repository

Untracked File: We need to add the file to the "staging area"

Modified File: We need to stage (add) the file to the "staging area"

```
git add [file]
```

This is the command to add the file to the "staging area".

Basic version control processes

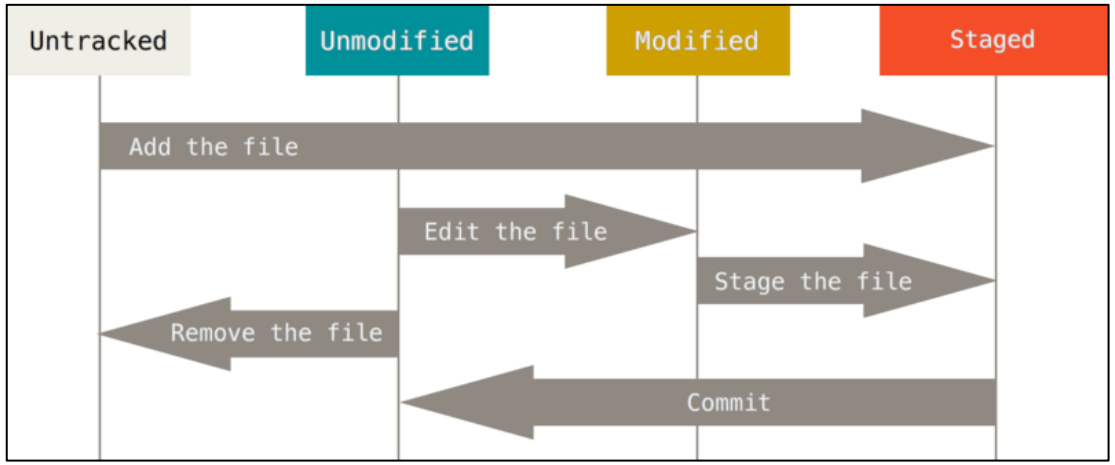


Image from: https://git-scm.com/book/en/v2/Git-Basics-Recording-Changes-to-the-Repository

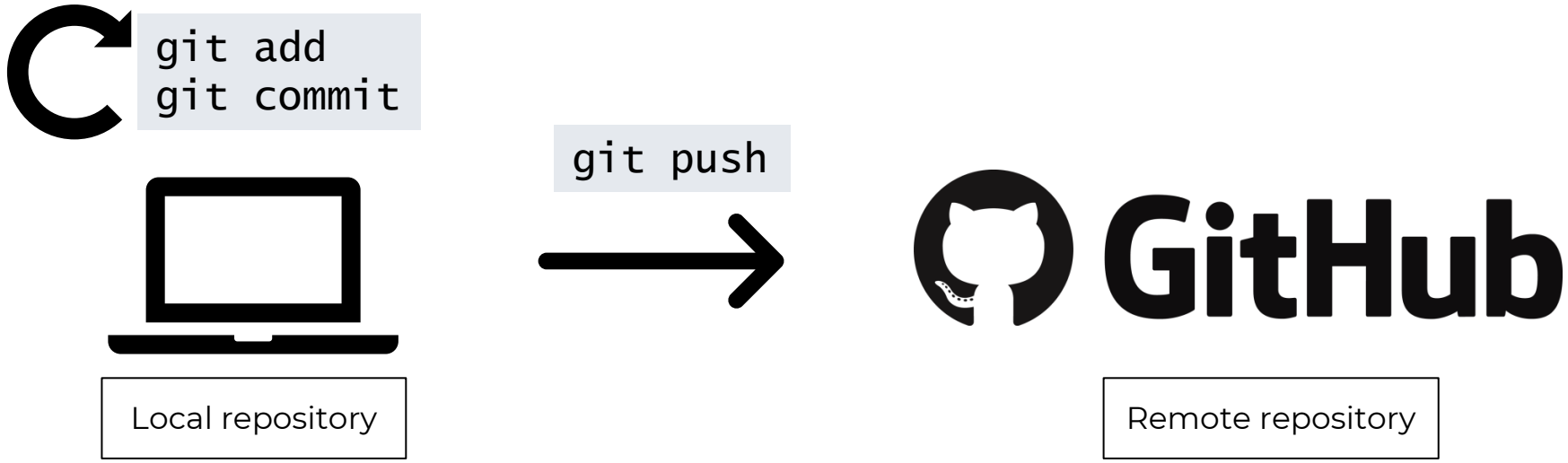
Staged File: We need to commit the file and all of its changes with some useful documentation or comment about the changes.

```
git commit -m “your_comment_goes_here" [file]
```

This is the command to commit the file from the “staging area”.

Basic version control processes

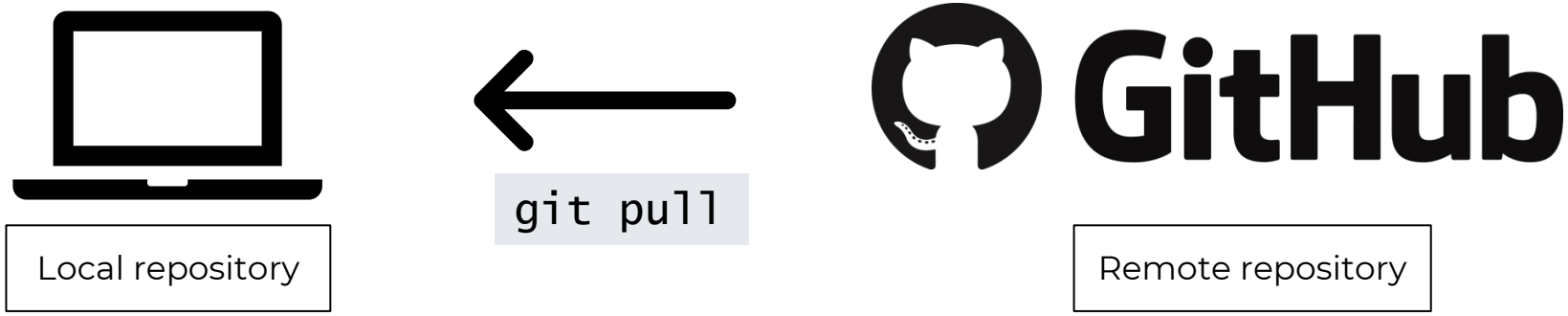
A file has been added to the staging area and the changes have been committed. This is "stored" locally (local repository) so the next step is to **push** these changes to our remote (online) repository in GitHub. Now the file has been version controlled!



Basic version control processes

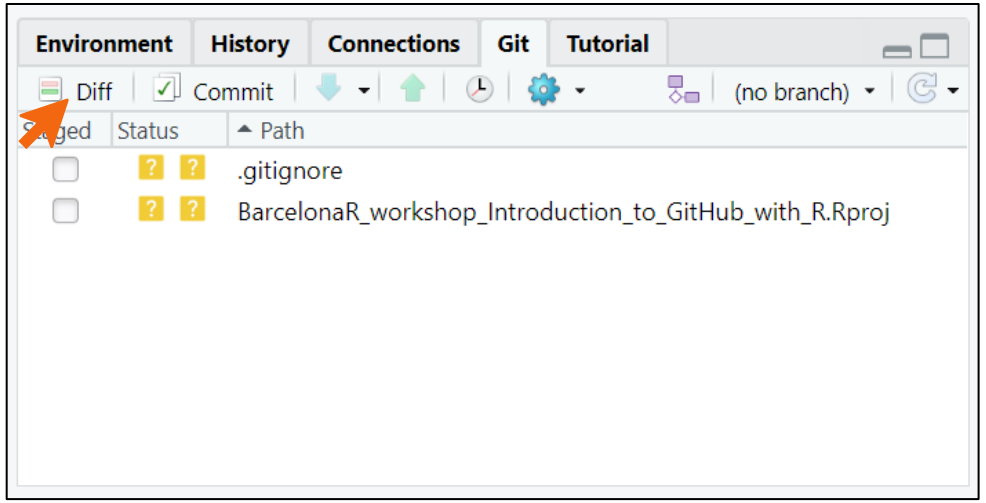
Let's say a collaborator has a copy of the up-to-date remote repository on his/her machine and decides to add a new R script to our project. They follow the steps of *adding*, *committing* and *pushing* the file to the remote repository.

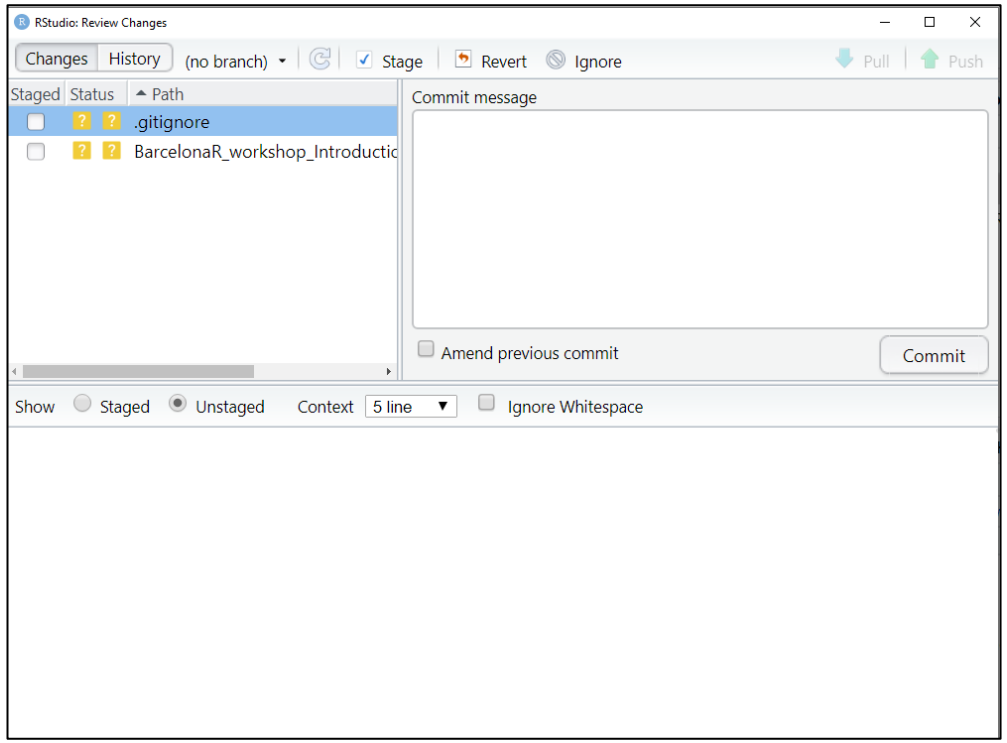
- Our local repository is now "behind" the current version of the project so we need to **pull** the changes (i.e. the new file) into our local repository.



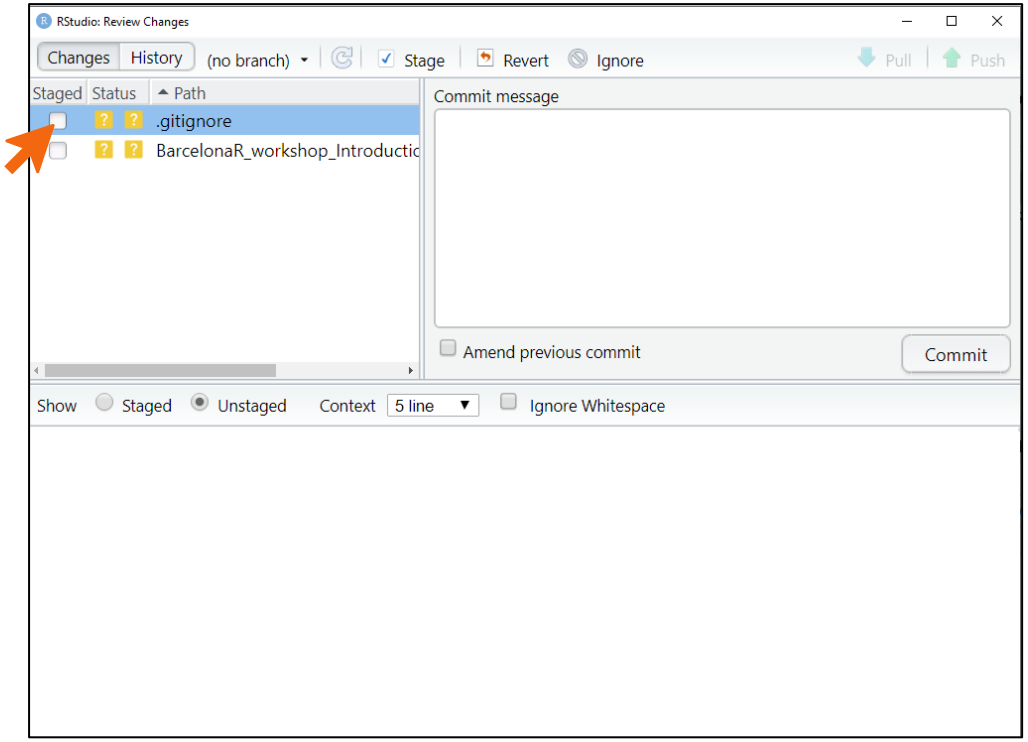
Basic version control processes

We can easily do all these version control actions in RStudio using the interactive git tab window...

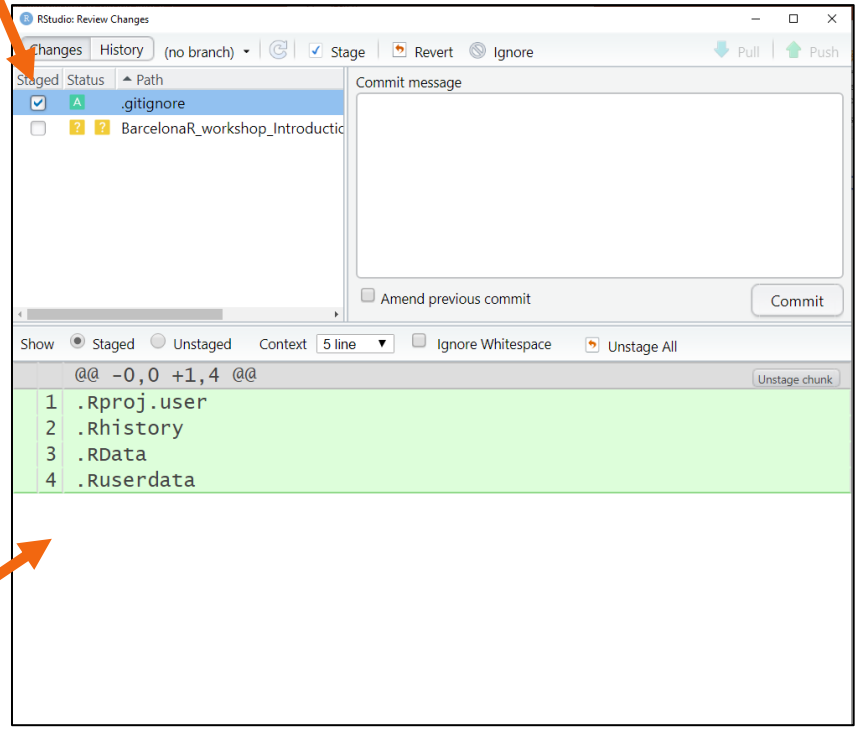




Basic version control processes

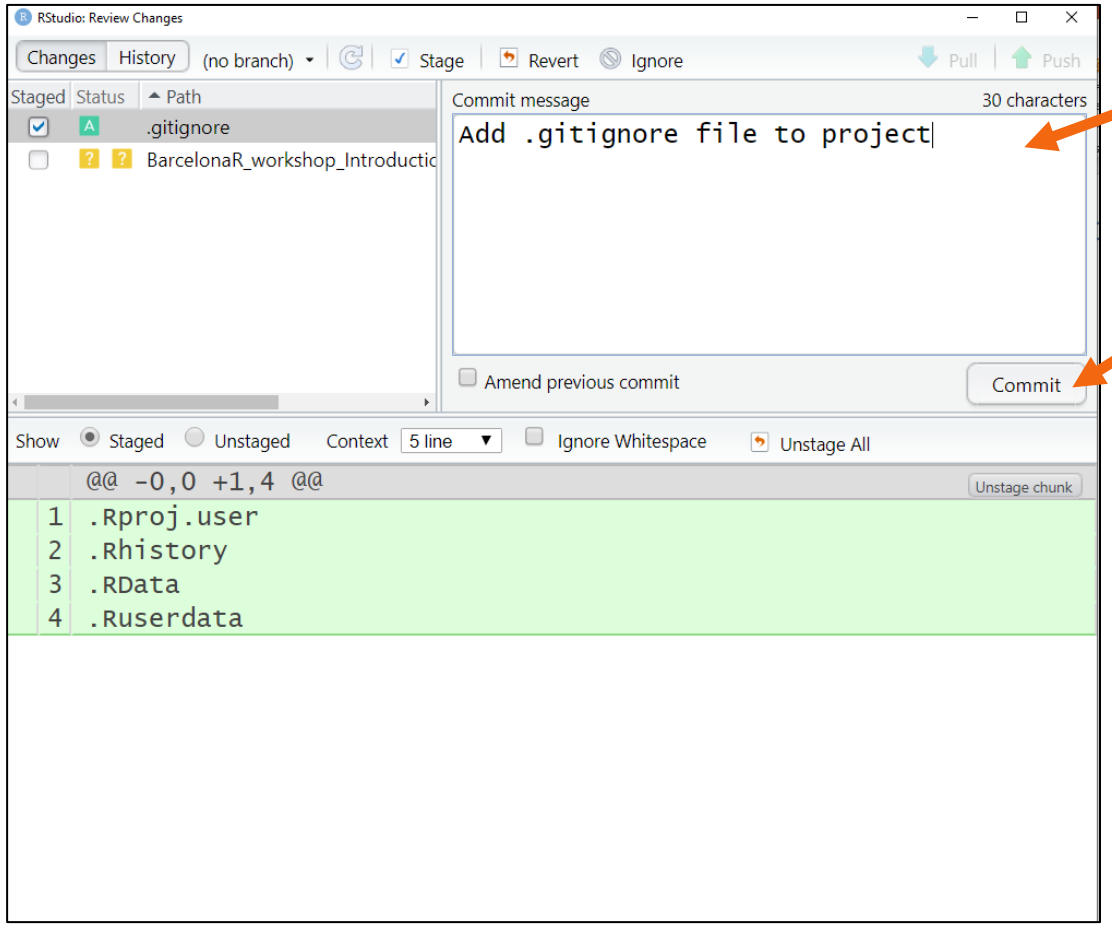


`git add`



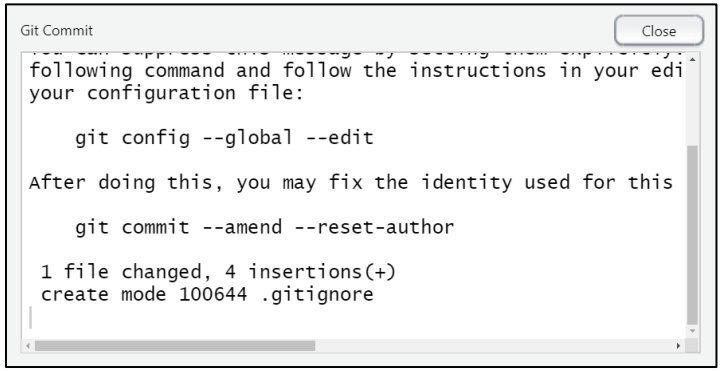
This tells us what are the changes (green highlight is added changes, red highlight is deleted changes)

Basic version control processes



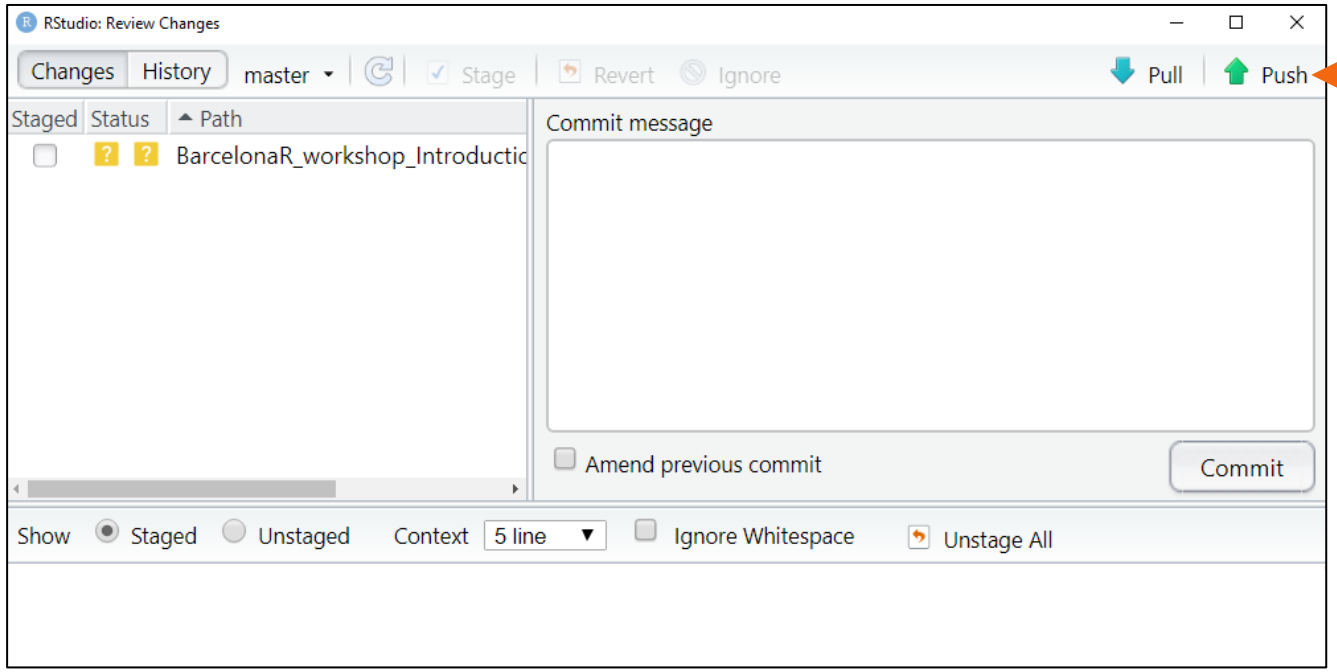
Insert the commit message for the file to be staged

`git commit`



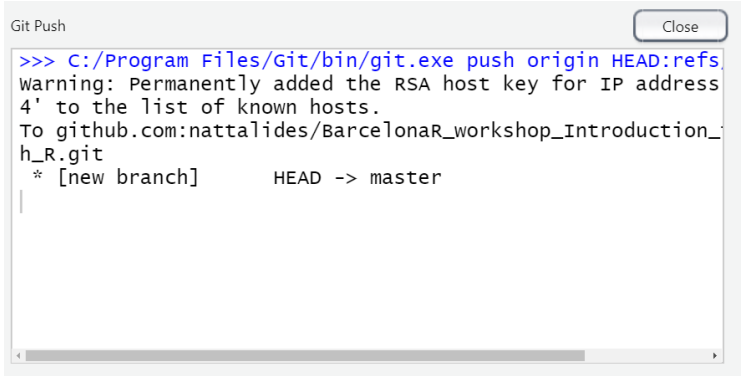
Some information about your commit

Basic version control processes



`git push`

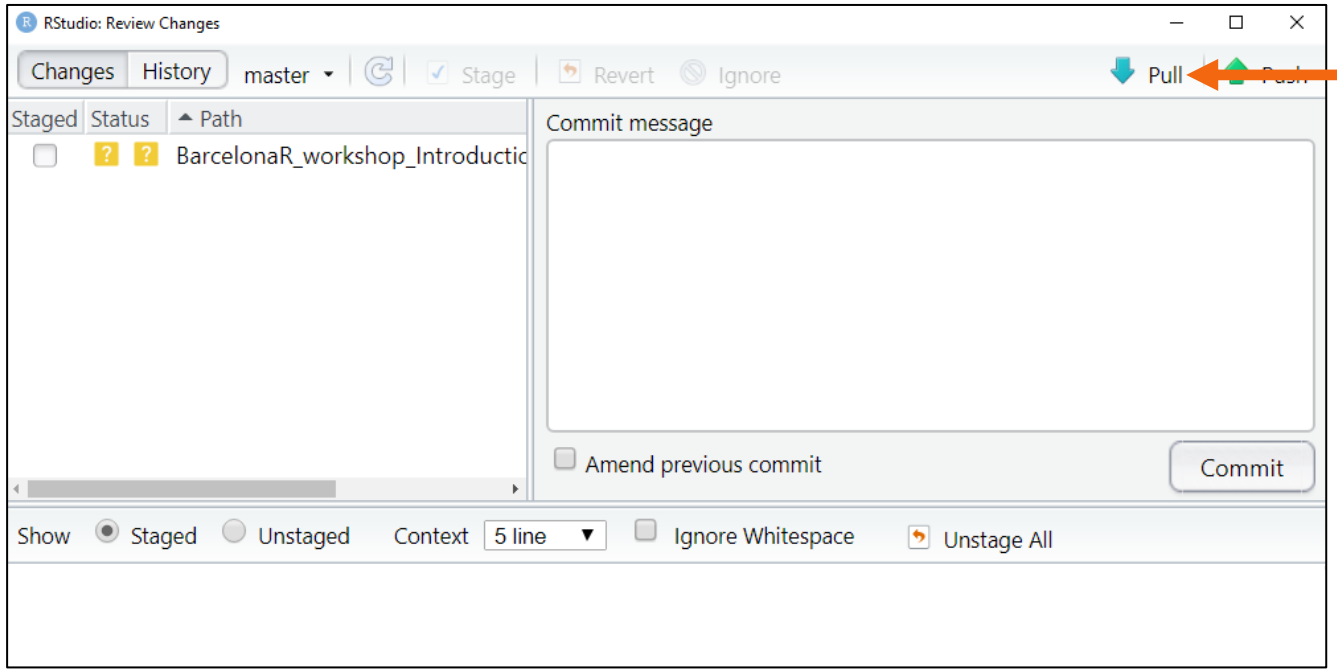
We can now push the staged changes from our local to our remote repository



Some information about your push.

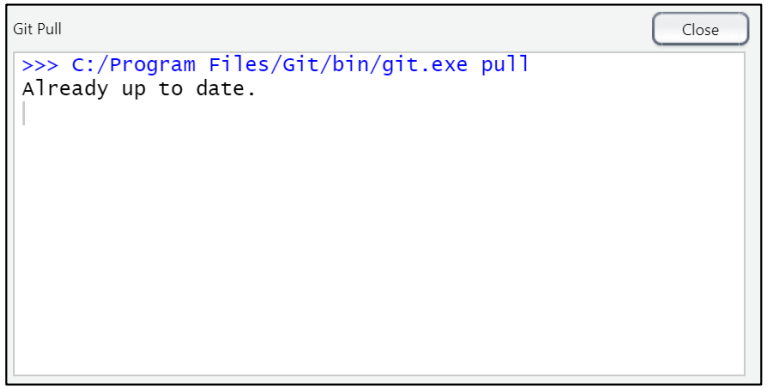
A **master branch** has been created

Basic version control processes



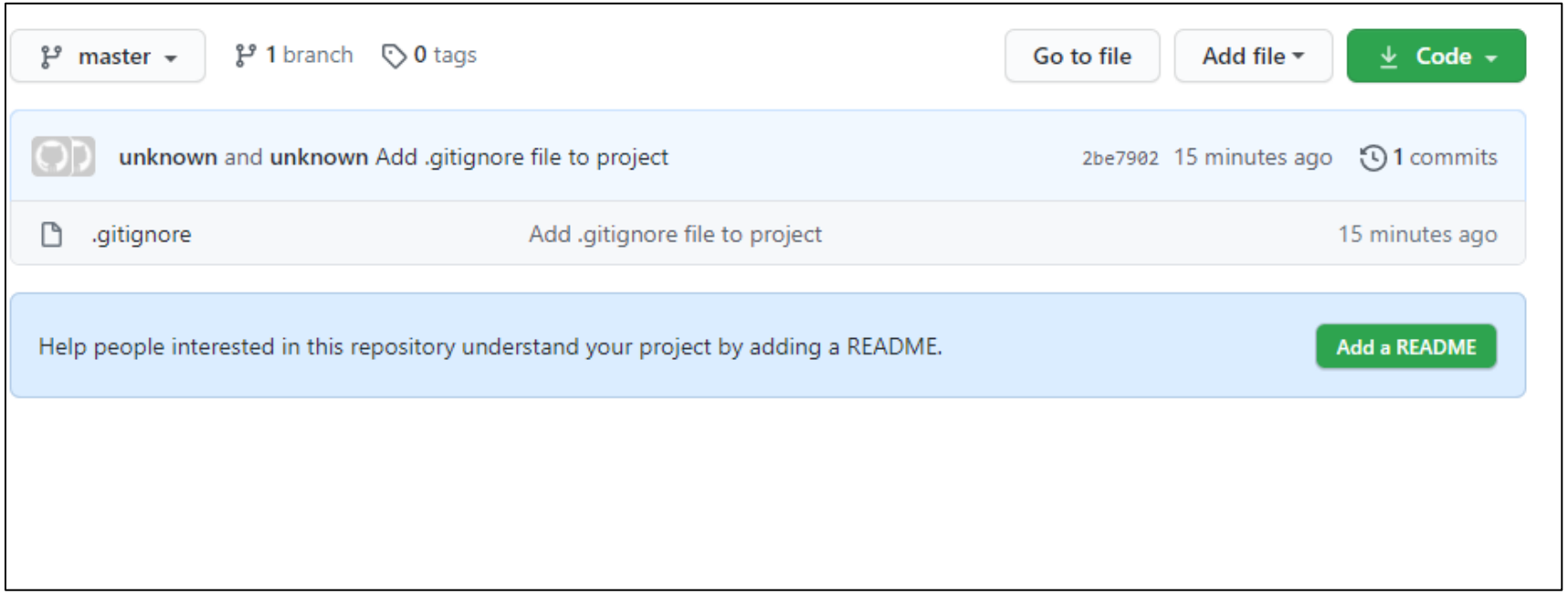
`git pull`

We can now pull any new changes from our remote to our local repository



Some information about your pull.

Congratulations! You have just added, committed and pushed a file into a GitHub repository within an R project in RStudio desktop!



Some further notes

During this workshop we have seen the basic version control actions. Using Git (and GitHub) can be a little frustrating at first but after a while you will get used to it and there is a definite reward to all of this hard work!

- There is a lot of useful resources online if you get stuck!
- Working in branches (we have not explored this) can improve the workflow and avoid headaches.
- Any sensitive (e.g. passwords) or large files (e.g. data) should not be version controlled… use the .gitignore file to “tell” Git to ignore these.
- A very good resource on Git and GitHub can be found at: https://happygitwithr.com/

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QUIZ TIME

https://ahaslides.com/GITHUB