

# GIT & MARKDOWN

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# WHAT WILL YOU LEARN THROUGH THIS CLASS?

- Understand what is git, why we use git, and how it works
- Copy the github repository of our course material to your local computer, and update it by “git pull origin main”
- Learn how to write Markdown files

Optional: set up a personal webpage with GitHub template

# TRACKING YOUR SCIENCE

**Saving revisions is very important.  
What kind of versioning do most of you use?**

Many biologists use the "multiple-file" system with cloud-based file sharing (e.g., Dropbox, Google Drive, Box)

```
Wangli-NCFC_2020面上.doc
Wangli-NSFC_2020面上-V1.docx
Wangli-NSFC_2020面上-V2.docx
Wangli-NSFC_2020面上-V3.docx
Wangli-NSFC_2020面上-V4.docx
Wangli-NSFC_2020面上.docx
lvyaqing简历.docx
lvyaqing简历.pdf
paper
sFig2SNPintersection.pdf
sFig7GeneIntersection.pdf
wangli-nsfc_2020面上-v5-zqwu.docx
wangli-nsfc_2020面上-v5-李诚.docx
wangli-nsfc_2020面上-v5-王海洋.docx
wangli-nsfc_2020面上-v5.docx
wangli-nsfc_2020面上-v5_BBWang.docx
wangli-nsfc_2020面上-v6.docx
wangli-nsfc_2020面上-v6_LL edits.docx
wangli-nsfc_2020面上-v6_hgj.docx
wangli-nsfc_2020面上-v7-孙成.docx
wangli-nsfc_2020面上-v7.docx
wangli-nsfc_2020面上-v8.docx
wangli-nsfc_2020面上-v8.pdf
wangli-nsfc_2020面上-v9.pdf
wangli-nsfc_2020面上.pdf
```

# TRACKING YOUR SCIENCE

**What are the potential shortcomings of  
this approach?**

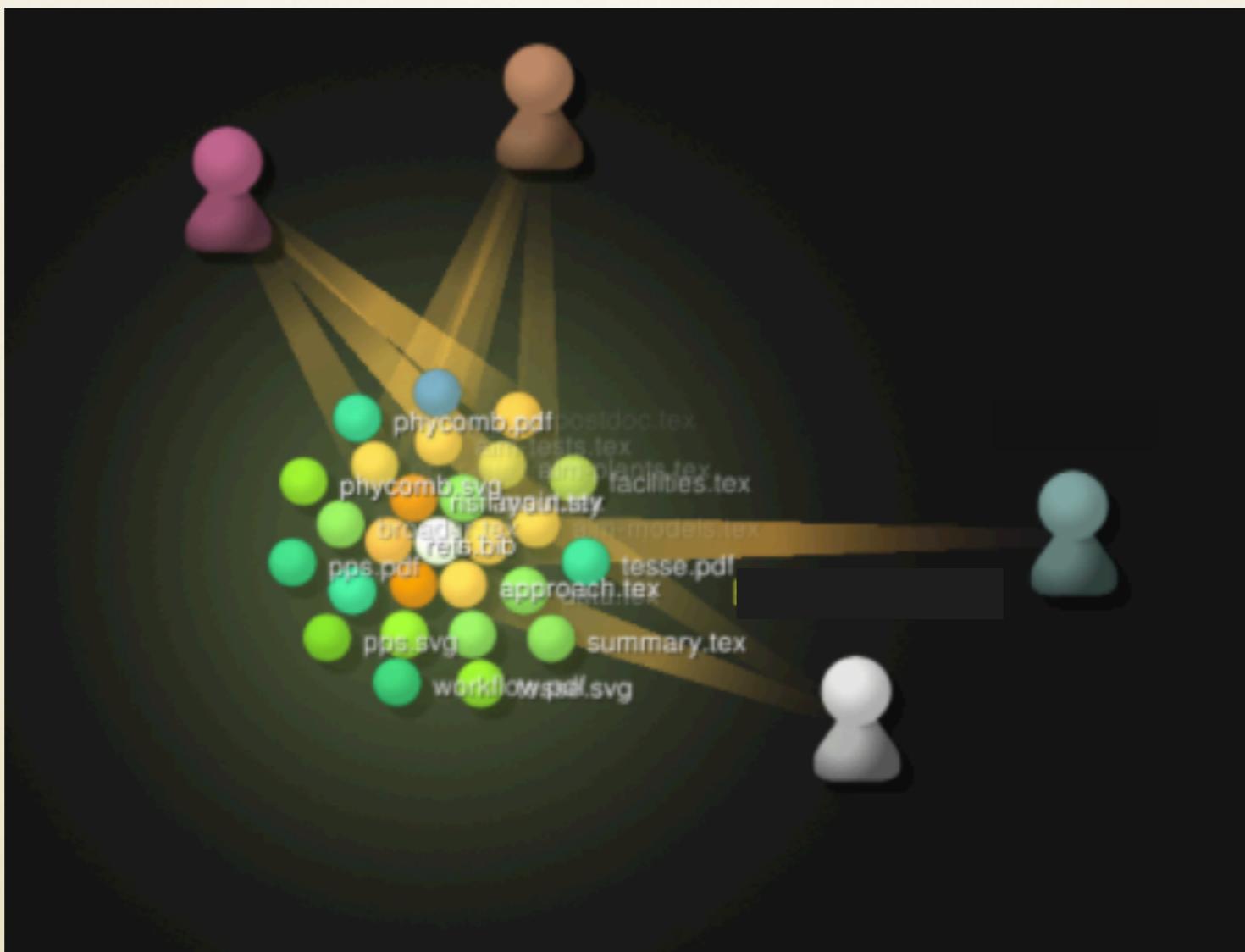
# TRACKING YOUR SCIENCE

With a version control system, the file history looks a lot different.

```
lwang at Benjamins-MacBook-Air in ~/Wang_Private/demography/manuscript/GB on mas
ter [!$]
$ ls
Cover_letter_Genome_Biology.pdf          bmc_article_nofiguresTwoAddFile.pdf
Reference.bib                            bmc_article_nofiguresTwoAddFile.tex
bioRxivRevision.pdf                     bmcart-biblio.sty
bioRxivRevision.tex                     bmcart.cls
bmc-mathphys bst                       figures
bmc_article.bib                         revision
bmc_article.pdf                         spbasic.bst
bmc_article.tex                          supplements
bmc_article_nofigures.pdf               vancouver.bst
```

# VERSION CONTROL

A version control system improves organization and collaboration



# VERSION CONTROL SYSTEMS

**What options are there for versioning projects?**

- The most common in biology are Git and SVN (and historically CVS).
- Many other options: [https://en.wikipedia.org/wiki/Comparison\\_of\\_version-control\\_software](https://en.wikipedia.org/wiki/Comparison_of_version-control_software)

# Version Control Systems

## What do they allow you to do?

- Track changes made to each file
- Revert the entire project or a single file to a previous version
- Review changes made over time
- View who modified the file (and **blame** them for something if necessary)
- Collaborate with others without overwriting their work or risk file corruption, etc.
- Have multiple independent *branches* of the same repository and make changes without effecting others' work.
- And more...

# WHY GIT IS NECESSARY?

- Git Allows You to Keep Snapshots of Your Project
- Git Helps You Keep Track of Important Changes to Code
- Git Helps Keep Software Organized and Available After People Leave

# USAGE OF GIT

- Sharing of bioinformatics scripts
- Bioinformatic Program development
- Documentation of bioinformatic analyses
- Collaborating on a manuscript



## Remote Git repository hosting services

There are several options for remote hosts

- You can set up your own server and host all of your repositories privately using [Gitolite](#) or [Gitosis](#) (not recommended)
- You can use a web-based Git host
  - [GitHub](#) Drawing: free public repositories & paid private repositories, with repositories over 1 GB discouraged
  - [Bitbucket](#) : unlimited free public & free private repositories, limited at 1-2 GB/repo (register with your .edu email to get unlimited collaborators on private repositories)

# ♥ Git ♥

## Despite the ♥, Git does have some limitations

Most relevant to this course and our fields are:

- *Repository size*: If your repository gets very large, working within it can be a problem. The network speed will be the main bottleneck. This is why the online Git hosts discourage repos over 1-2 GB.
- *File size*: A single large file can be problematic, particularly if it is frequently being modified. This can also lead to swollen repositories. GitHub will not allow any file over 100 MB.
- *File type*: Git works best with text files, you can have binary files in your repository, but you lose some functionality of version control (like `diff`). Binary files are also often very large. Thus, it is recommended that you keep binary files to a minimum. (This means that it is not practical to use Git to collaborate on MS Word documents.)



## Demo: Clone a Repository

- You become familiar with the concepts by using Git. We will start by cloning the GitHub repository of our course.
- Start by going to <https://github.com/lepisorus/agisPracticalBioinformatics2021> to get the URL.

```
lwang at Benjamins-MacBook-Air in ~/new
$ git clone https://github.com/WangliLab/CAAS_PracticalBioinformat
Cloning into 'CAAS_PracticalBioinformatics_2020Aut'...
remote: Enumerating objects: 20, done.
remote: Counting objects: 100% (20/20), done.
remote: Compressing objects: 100% (18/18), done.
remote: Total 20 (delta 5), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (20/20), done.
```

- Note that using the url `git@github...` instead of `https://github...`

# ♥ Git ♥

## Some helpful commands for this cloned repository

Always `pull` from the repository before doing anything with the contents

```
$ git pull origin master
```

Check the `status` of your local files

```
$ git status
```

See the `log` of the snapshots and their commit messages

```
$ git log
```

Compare the `differences` a file you have modified and the last commit

```
$ git diff README.rst
```



## Some helpful commands for this cloned repository

Replace a file you modified with the most recent commit using `checkout`

```
$ git checkout README.rst
```

Find out which `branch` you're on

```
$ git branch
```

Change to a different branch

```
$ git checkout h5step7
```

Pull to update from `h5step7`

```
$ git pull origin h5step7
```



## What can you do with someone else's GitHub repository?

If you do not have *push rights*

- You can only clone the repository and make changes locally
- You can **fork** their repository and develop it independently
- You can submit a ***pull request*** to their repository if you want to contribute to the original project
- You can contact the owner of the repository and ask them to include you as a contributor and give you push rights (it is recommended that you discuss the nature of your collaboration with them first)



## Demo: Clone a Repository

Let's create a new Git repository and host it on GitHub using your own accounts.

But first, let's tell Git who you are

```
lwang at Benjamins-MacBook-Air in ~
[$ git config --global user.name "lepisorus"

lwang at Benjamins-MacBook-Air in ~
[$ git config --global user.email "lilepisorus@gmail.com"
```



## Some helpful commands for your new repository

Initialize a new Git repository

```
$ git init
```

After a file has been added or modified, you can stage the file

```
$ git add README.md
```

Commit the file to your local repository and write a message

```
$ git commit -m "initial commit (README.md)"
```



## Some helpful commands for your new repository

After you have made your commit, the repository is up-to-date locally. Next you need to connect your local repo to the remote.

Add the remote

```
$ git remote add origin git@github.com:username/repo-name.git
```

Push your snapshot to the remote

```
$ git push -u origin master
```

# PRACTICE GIT

www.github.com

“Sign up”

A screenshot of a Mac OS X desktop showing a Chrome browser window displaying the GitHub homepage. The address bar shows 'github.com'. The top navigation bar includes links for Product, Solutions, Open Source, and Pricing. A search bar and 'Sign in'/'Sign up' buttons are also present. A red arrow points to the 'Sign up' button. The main content features a large globe graphic with a blue glow and a small cartoon astronaut at the bottom right. Text on the page includes 'GitHub Universe: A global developer event', 'Let's build from here, together.', and statistics like '83+ million Developers'. The status bar at the bottom shows system information including 'MEM 83%', battery level, signal strength, and the date 'Tue Sep 20 10:08'.

GitHub: Where the world builds

Product Solutions Open Source Pricing

Search GitHub Sign in Sign up

GitHub Universe: A global developer event  
Register now to get early bird passes 20% off

Let's build from here, together.

The complete developer platform to build, scale, and deliver secure software.

Email address Sign up for GitHub

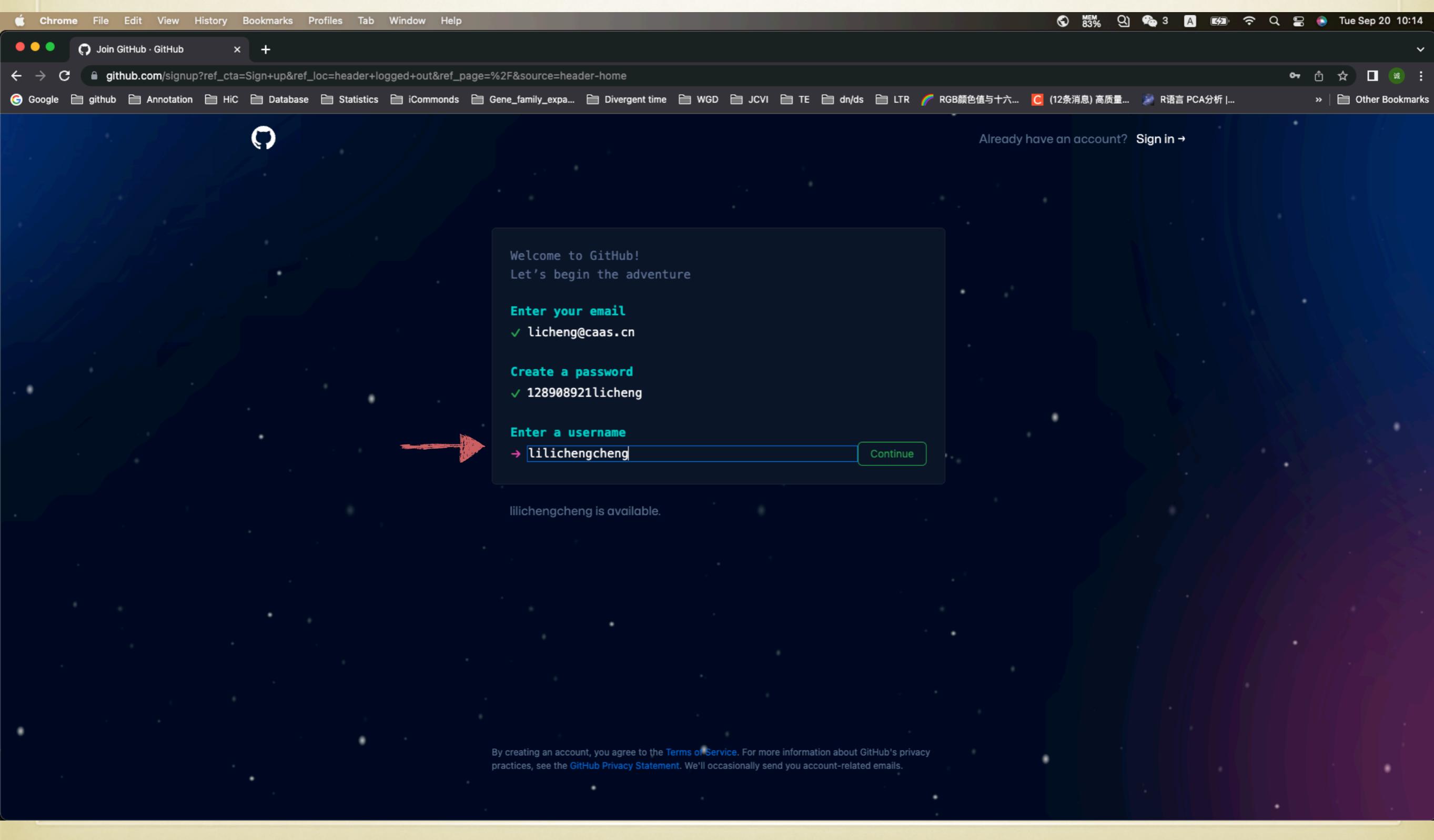
83+ million Developers

4+ million Organizations

200+ million Repositories

90% Fortune 100

1. Your email address and a password
2. Type in your “username”



Chrome File Edit View History Bookmarks Profiles Tab Window Help

Join GitHub · GitHub

github.com/signup?ref\_cta=Sign+up&ref\_loc=header+logged+out&ref\_page=%2F&source=header-home

Google github Annotation HiC Database Statistics iCommands Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 I...

Tue Sep 20 10:16

Welcome to GitHub!  
Let's begin the adventure

**Enter your email**  
✓ licheng@caas.cn

**Create a password**  
✓ 128908921licheng

**Enter a username**  
✓ lilichengcheng

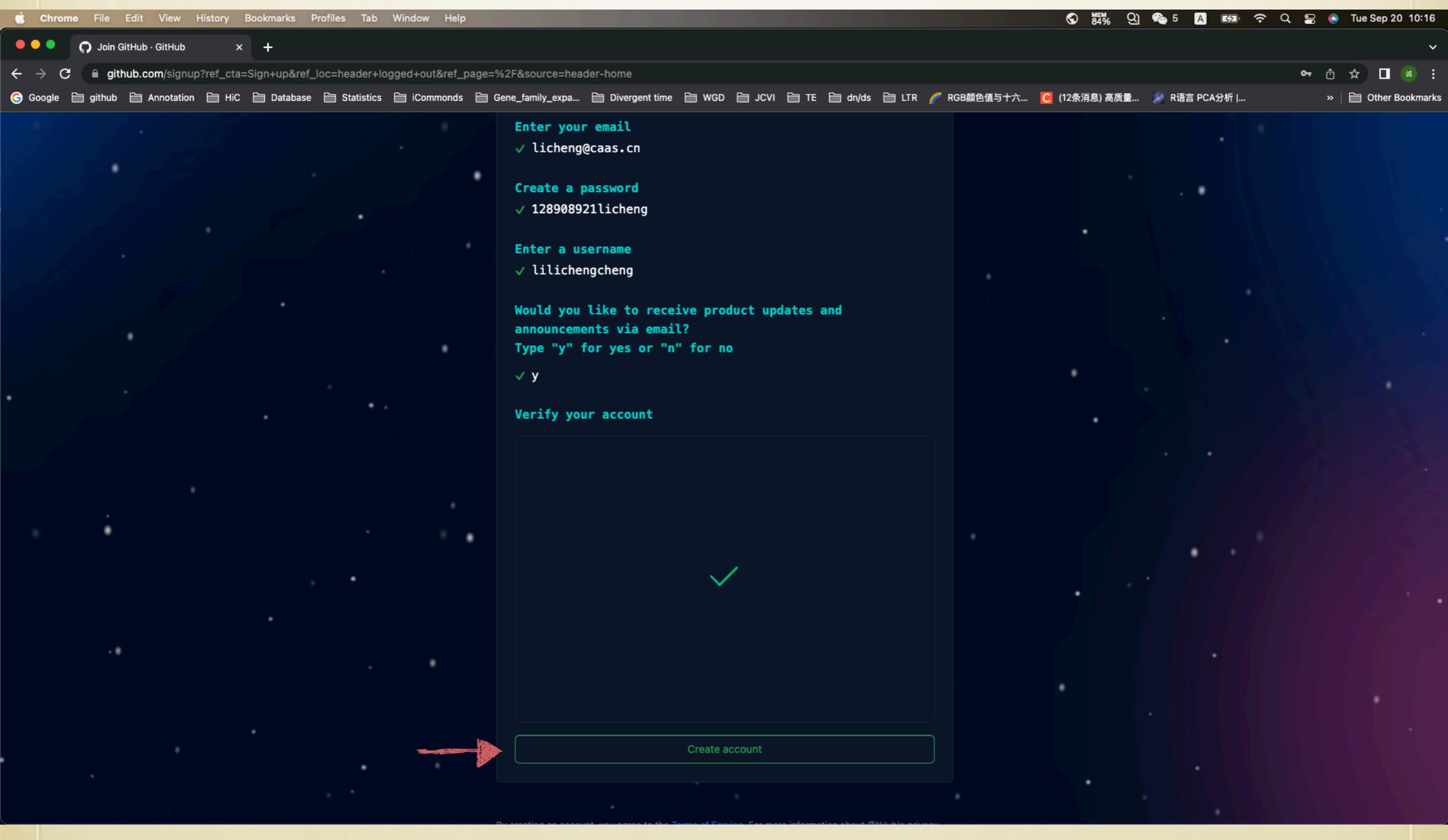
**Would you like to receive product updates and announcements via email?**  
Type "y" for yes or "n" for no  
✓ y

**Verify your account**

选出旋涡星系



↻ ⇲



Chrome File Edit View History Bookmarks Profiles Tab Window Help

MEM 82% 5 A Tue Sep 20 10:17

How many team members will be working with you? [Skip personalization](#)

github.com/join/welcome

Google github Annotation HiC Database Statistics iCommands Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 I... Other Bookmarks

# Welcome to GitHub

We are glad you're here.

**How many team members will be working with you?**

This will help us guide you to the tools that are best suited for your projects.

[Just me](#) [2 - 5](#) [5 - 10](#)

[10 - 20](#) [20 - 50](#) [50+](#)

**Are you a student or teacher?**

[Student](#) [Teacher](#)

[Continue](#)

# Done!

Chrome File Edit View History Bookmarks Profiles Tab Window Help

MEM 82% Q 5 A ⚡ WiFi S Tue Sep 20 10:17

GitHub [github.com](https://github.com)

Google [github](#) [Annotation](#) [HiC](#) [Database](#) [Statistics](#) [iCommands](#) [Gene\\_family\\_expa...](#) [Divergent time](#) [WGD](#) [JCVI](#) [TE](#) [dn/ds](#) [LTR](#) [RGB颜色值与十六...](#) [\(12条消息\) 高质量...](#) [R语言 PCA分析 |...](#)

Search or jump to... Pull requests Issues Marketplace Explore

Create your first project

Welcome to your personal dashboard, where you can find an introduction to how GitHub works, tools to help you build software, and help merging your first lines of code.

Start writing code

Start a new repository Create your profile README Contribute to an existing repository

Collaborate on code with others and track your work in a repository.

Create a new repository Create a README

Use tools of the trade

Write code in your web browser Install a powerful code editor Set up your local dev environment

Use the [github.dev](#) web-based editor from your repository or pull request to create and commit changes.

Visual Studio Code is a multi-platform code editor optimized for building and debugging software.

After you set up Git, simplify your dev workflow with GitHub Desktop, or bring GitHub to the command line.

Get started on GitHub

About version control and Git The GitHub Flow

Learn about the version control system, Git, and how it works with GitHub. Adopt GitHub's lightweight, branch-based workflow to collaborate on projects.

What is GitHub?

Universe 2022

Let's build from here

Join the global developer event for cloud, security, community, and AI.

Register today and get a 20% off early bird discount.

GitHub Copilot

Get suggestions for lines of code and entire functions in real-time

Learn more about Copilot

Latest changes

- 3 hours ago Automatic Single Sign On for Enterprise Managed Users – Public Beta
- 4 days ago Git commit author shown when squash merging a pull request
- 6 days ago GitHub Sponsors: change notice for the 'custom amount' setting
- 6 days ago GitHub for iOS: Edit files in pull requests

[View changelog →](#)

# Create a new repository

Chrome File Edit View History Bookmarks Profiles Tab Window Help

MEM 82% 5 A ⚡ WiFi S Tue Sep 20 10:17

GitHub [github.com](https://github.com)

Google GitHub Annotation HiC Database Statistics iCommands Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 | Other Bookmarks

Search or jump to... Pull requests Issues Marketplace Explore

Create your first project  
Ready to start building? Create a repository for a new idea or bring over an existing repository. Keep contributing to it.

[Create repository](#) [Import repository](#)

Recent activity  
When you take actions across GitHub, we'll provide links to that activity here.

The home for all developers — including you.

Welcome to your personal dashboard, where you can find an introduction to how GitHub works, tools to help you build software, and help merging your first lines of code.

Start writing code

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Use tools of the trade

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Universe 2022 Let's build from here Register now

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- 6 days ago GitHub for iOS: Edit files in pull requests

[View changelog →](#)

# Create a new repository

Chrome File Edit View History Bookmarks Profiles Tab Window Help

MEM 84% 13 A 🔋 WiFi 🔍 Tue Sep 20 10:29

Create a New Repository x +

github.com/new

Google GitHub Annotation HiC Database Statistics iCommands Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 | Other Bookmarks

## Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository](#).

**Owner \***  **Repository name \***  

Great repository names are short and memorable. Need inspiration? How about [refactored-carnival](#)?

**Description (optional)**

 **Public**  
Anyone on the internet can see this repository. You choose who can commit.

 **Private**  
You choose who can see and commit to this repository.

**Initialize this repository with:**  
Skip this step if you're importing an existing repository.

**Add a README file**  
This is where you can write a long description for your project. [Learn more](#).

**Add .gitignore**  
Choose which files not to track from a list of templates. [Learn more](#).

.gitignore template:

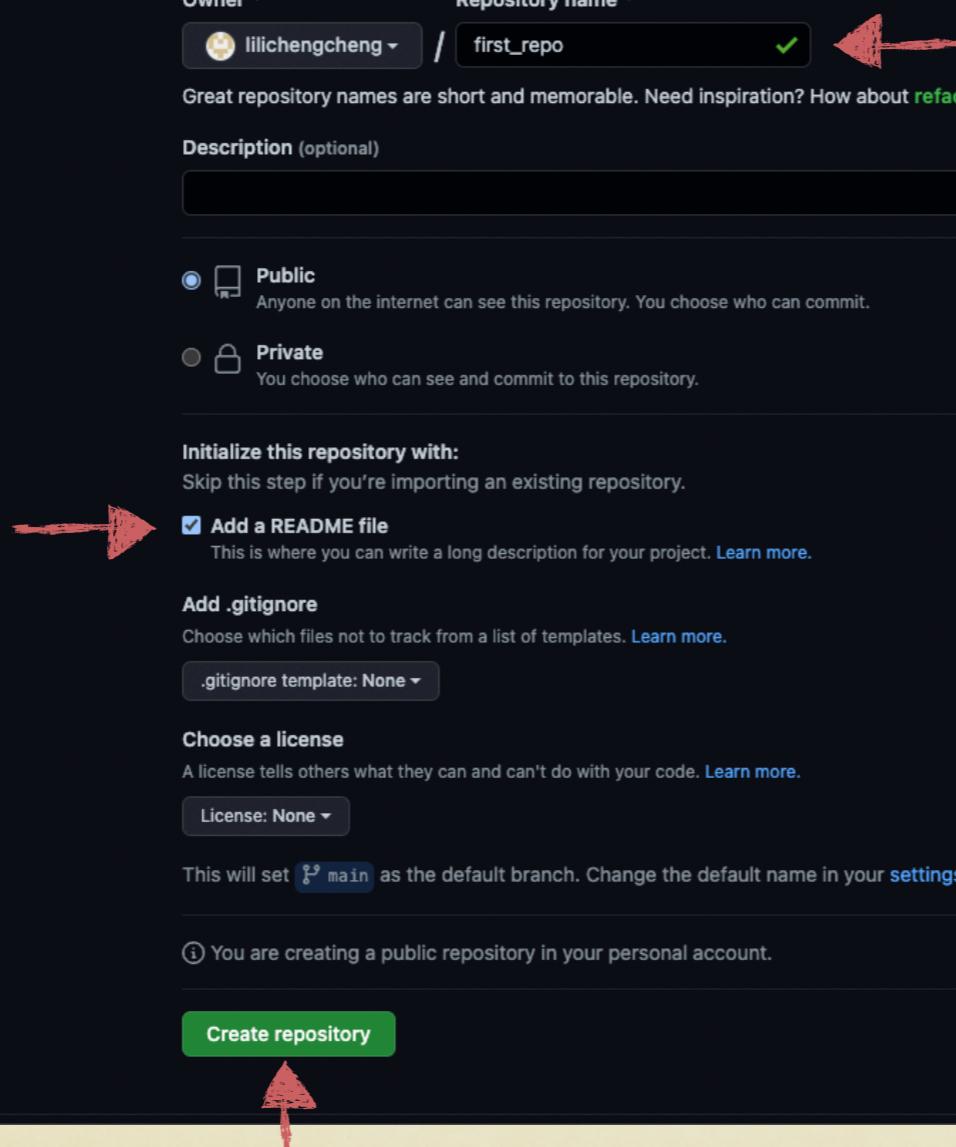
**Choose a license**  
A license tells others what they can and can't do with your code. [Learn more](#).

License:

This will set  **main** as the default branch. Change the default name in your [settings](#).

ⓘ You are creating a public repository in your personal account.

**Create repository**



# A new repository is done!

The screenshot shows a GitHub repository page for 'lilichengcheng/first\_repo'. The repository is public and contains one branch ('main') and one commit ('Initial commit'). The commit details a file named 'README.md' with the content 'Initial commit'. The repository has 0 stars, 1 watch, and 0 forks. There are sections for About, Releases, and Packages, all of which are currently empty.

Chrome File Edit View History Bookmarks Profiles Tab Window Help

lilichengcheng/first\_repo

github.com/lilichengcheng/first\_repo

Google GitHub Annotation HiC Database Statistics iCommons Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 ... Other Bookmarks

Search or jump to... Pull requests Issues Marketplace Explore

lilichengcheng / first\_repo Public

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 1 branch 0 tags

lilichengcheng Initial commit 3f31e02 now 1 commit

README.md Initial commit now

README.md

first\_repo

About

No description, website, or topics provided.

Readme 0 stars 1 watching 0 forks

Releases

No releases published Create a new release

Packages

No packages published Publish your first package

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# Do something under your “first\_repo”

A screenshot of a GitHub repository page for 'lilichengcheng/first\_repo'. The page shows a single commit from 'lilichengcheng' titled 'Initial commit' with a timestamp of 'now'. The commit message is 'Initial commit'. The repository has 1 branch ('main') and 0 tags. On the right side, there is a sidebar with a red arrow pointing to the 'Code' dropdown menu. The sidebar also displays basic repository statistics: 'No description, website, or topics provided.', 0 stars, 1 watching, and 0 forks. It also includes sections for 'Releases' (no releases published) and 'Packages' (no packages published). At the bottom, there is a footer with links to GitHub's Terms, Privacy, Security, Status, Docs, Contact GitHub, Pricing, API, Training, Blog, and About pages.

lilichengcheng/first\_repo Public

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 1 branch 0 tags

lilichengcheng Initial commit 3f31e02 now 1 commit

README.md Initial commit now

README.md

first\_repo

No description, website, or topics provided.

Readme 0 stars 1 watching 0 forks

Releases

No releases published Create a new release

Packages

No packages published Publish your first package

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# Do something under your “first\_repo”

The screenshot shows a GitHub repository page for the user 'lilichengcheng' named 'first\_repo'. The repository is public and contains one branch ('main') and one commit ('Initial commit'). The commit message is 'Initial commit'. There is a single file, 'README.md', which contains the text 'first\_repo'. On the right side of the page, there is an 'About' section with the following details:

- No description, website, or topics provided.
- Clone options: HTTPS (selected), SSH, GitHub CLI (New).
- URL: [https://github.com/lilichengcheng/first\\_repo](https://github.com/lilichengcheng/first_repo)
- Readme: Initial commit
- Statistics: 0 stars, 1 watching, 0 forks.
- Releases: No releases published. Create a new release.
- Packages: No packages published. Publish your first package.

A red arrow points to the '0 stars' link in the statistics section. At the bottom of the page, there is a footer with links to GitHub's Terms, Privacy, Security, Status, Docs, Contact GitHub, Pricing, API, Training, Blog, and About pages.

Do something under your “first\_repo”

git clone https://github.com/lilichengcheng/first\_repo.git

```
[licheng@trainning ~]$  
[licheng@trainning ~]$ git clone https://github.com/lilichengcheng/first_repo.git  
Cloning into 'first_repo'...  
remote: Enumerating objects: 3, done.  
remote: Counting objects: 100% (3/3), done.  
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0  
Receiving objects: 100% (3/3), done.  
[licheng@trainning ~]$ ls  
first_repo github Isoetes_CAM test  
[licheng@trainning ~]$
```

# Do something under your “first\_repo”

ssh-keygen -t rsa -C “licheng@caas.cn”

Obtain ssh key (获取身份认证密钥)

```
[licheng@trainning ~]$ pwd  
/home/licheng  
[licheng@trainning ~]$ ssh-keygen -t rsa -C "licheng@caas.cn" ←  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/licheng/.ssh/id_rsa): 回车  
Enter passphrase (empty for no passphrase): 回车  
Enter same passphrase again: 回车  
Your identification has been saved in /home/licheng/.ssh/id_rsa  
Your public key has been saved in /home/licheng/.ssh/id_rsa.pub  
The key fingerprint is:  
SHA256:j2dL8AVCvGTuEiV1xHLBMwNFieXHC7lGNwAXB/5RaYs licheng@caas.cn  
The key's randomart image is:  
+---[RSA 3072]---+  
|   o=@%=. . . |  
| ..B=0= .o . |  
| * .+B+*o . |  
| . oo BE+. |  
| oS o + |  
| . . * . |  
| .. * |  
| + . |  
| . |  
+---[SHA256]---+  
[licheng@trainning ~]$ cd .ssh/  
[licheng@trainning .ssh]$ ls  
id_rsa id_rsa.pub known_hosts known_hosts.old  
[licheng@trainning .ssh]$ cat id_rsa.pub  
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQgQCuAL2wvCGfK3fZiP5HRbS2Xdr/Gazte3jLB1QF+KEqjYk5Qc  
iRGf31wq7vZKi wFqtBl/S8xB4g1Zx5t7btUpajQbyAbOR7EpwlZwg/7dsdZMk8mPvgLtE9ewLLJSoLsgxoIg7x  
9j4ZJURtRp680aq8dafc+l+gJdd/Jt3kTCl8Ta1ShuFvNjWiBxNVlHOF8zP1IXx/MMECw5mP2qcxtQSG07wu36  
frwWbrxb0Aqy6KLi1jez9CSI0kg1CN+RFelLzF9i5Sk8nxn5T/KIsye1R/J5u4bUAZaGjTELN7+zZw0E1h04gi  
8DPjZ2JkkUr7NuWVD+excmtaGsrUwG/AwMuMoicQ478pqbySPS00aEVjyr6jFBgDszo5NM+xkY0g63n5XnJztU8  
KYvTk8hv hK4KNDDcl k8bI8bkY7TdLxS1se+Tw+PdsQotBxI6RLb6qqq3Ppzdeh2tgRiV+FRV04rTvB2Ww8zrB1  
ziQwmFU17w0qCVqQ2iN2Rj/336b0a47D7E= licheng@caas.cn  
[licheng@trainning .ssh]$
```

# Add ssh key

A screenshot of a GitHub repository page for 'lilichengcheng/first\_repo'. The page shows a single commit from 'lilichengcheng' titled 'Initial commit' made 1 hour ago. The repository has 1 branch and 0 tags. On the right side, there is a user profile sidebar for 'lilichengcheng' with various options like 'About', 'Releases', and 'Packages'. A large red arrow points from the bottom left towards the 'Settings' link in the sidebar.

Chrome File Edit View History Bookmarks Profiles Tab Window Help

lilichengcheng/first\_repo

github.com/lilichengcheng/first\_repo

Google GitHub Annotation HiC Database Statistics iCommons Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 |...

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lilichengcheng / first\_repo Public

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 1 branch 0 tags

lilichengcheng Initial commit 3f31e02 1 hour ago 1 commit

README.md Initial commit 1 hour ago

README.md

first\_repo

About

No description, website, or topics provided.

Readme 0 stars 1 watching 0 forks

Releases

No releases published Create a new release

Packages

No packages published Publish your first package

Signed in as  
lilichengcheng

Set status

Your profile Your repositories Your codespaces Your projects Your stars Your gists

Upgrade Feature preview Help Settings

Sign out

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<https://github.com/settings/profile>

# Add ssh key

A screenshot of a Mac OS X desktop showing a Chrome browser window. The title bar includes standard OS X icons for file operations and system status. The browser window shows the GitHub profile settings page for the user 'lilichengcheng'. The sidebar on the left lists various profile sections like Public profile, Account, Appearance, etc. A red arrow points to the 'SSH and GPG keys' section in the sidebar. The main content area is titled 'Public profile' and contains fields for Name, Profile picture, Public email, Bio, URL, Twitter username, Company, and Location. A note at the bottom states that all fields are optional and can be deleted at any time. A green 'Update profile' button is at the bottom right. The address bar shows the URL 'github.com/settings/profile'. The status bar at the bottom displays system information including battery level (83%), signal strength, and the date/time.

# Add ssh key

A screenshot of a Mac OS X desktop showing a Chrome browser window. The title bar says "SSH and GPG keys". The address bar shows "github.com/settings/keys". The page content is the GitHub account settings for user "lilichengcheng". The left sidebar has a "SSH and GPG keys" section selected. The main area shows "SSH keys" and "GPG keys" sections, both of which are currently empty. A red arrow points to the "New SSH key" button in the SSH keys section.

SSH keys

New SSH key

GPG keys

New GPG key

Vigilant mode

Flag unsigned commits as unverified

Code, planning, and automation

Repositories

Packages

GitHub Copilot

Pages

Saved replies

Security

Code security and analysis

Integrations

Applications

<https://github.com/settings/ssh/new>

# Add ssh key

The screenshot shows the GitHub 'SSH keys / Add new' page. The user's profile 'lilichengcheng' is at the top left. The 'SSH and GPG keys' section is highlighted in blue. A red box highlights the 'Title' input field containing 'lilichengcheng\_ssh\_key'. Another red box highlights the 'Key' text area which contains an SSH RSA key. A third red box highlights the green 'Add SSH key' button at the bottom left of the key area.

lilichengcheng  
Your personal account

SSH keys / Add new

Title:

Key type: Authentication Key

Key:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAQABAAQCuAl2wvCGfK3fZiP5HRbS2Xdr/Gazte3iB1OF+KEqiYk5QciRGf31wq7vZK
iwFatBl/S8xB4g1Zx5t7btUpaiQbyAbOR7EpwlZwg/7dsdZMk8mPvgLtE9ewILJSolsgxolq7x9i4ZJURtRp680aq8dafc
+i+gJdd/Jt3kTCI8Ta1ShuFvNjW/BxNVlHOF8zP1IXx/MMECw5mP2acxTQSG07wu36frwWbrxbOaqy6KLi1jez9CSi0kg
1CN+RFellzF9i5Sk8nxn5T/Kisye1R/J5u4bUAZaGjTELN7+zZwOEh04gi8DPjZ2JkkUr7NuWVD+excmtaGsrUwG/Aw
uMoicQ478pbvSPS0oaEViyr6iFBgDszo5NM+xkYOg63n5XnJztU8KYrTk8vhK4KNDDclk8bl8bK7TdLxS1se+Tw+
PdsQotBxI6RLb6qqq3Ppzdeh2tgRiv+FRV04rTvB2Ww8zrB1zIQwmFU17ww0qCVoQziN2Rj/3J6b0u47D7E=
licheng@caas.cn
```

Add SSH key

# Add ssh key is done!

Chrome File Edit View Bookmarks Profiles Tab Window Help

SSH and GPG keys

github.com/settings/keys

Google GitHub Annotation HiC Database Statistics iCommons Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... (12条消息) 高质量... R语言 PCA分析 |... Other Bookmarks

Search or jump to... Pull requests Issues Marketplace Explore

lilichengcheng Your personal account Go to your personal profile

Public profile Account Appearance Accessibility Notifications

Access Billing and plans Emails Password and authentication SSH and GPG keys (selected)

Organizations Moderation

Code, planning, and automation

Repositories Packages GitHub Copilot Pages Saved replies

Security

Code security and analysis

Integrations Applications

SSH keys

New SSH key

This is a list of SSH keys associated with your account. Remove any keys that you do not recognize.

Authentication Keys

lilichengcheng\_ssh\_key  
SHA256: j2dL8AVCvGTuEiV1xHLBmWFieXHC7lGNwAXB/5RaYs  
Added on Sep 20, 2022  
Never used — Read/write

Delete

GPG keys

New GPG key

There are no GPG keys associated with your account.

Learn how to [generate a GPG key](#) and add it to your account.

Vigilant mode

Flag unsigned commits as unverified

This will include any commit attributed to your account but not signed with your GPG or S/MIME key.  
Note that this will include your existing unsigned commits.

[Learn about vigilant mode.](#)

# Obtain your “personal access token” (个人访问令牌)

The screenshot shows a Mac OS X desktop with a Chrome browser window open to the GitHub 'SSH and GPG keys' settings page. The browser's address bar shows the URL `github.com/settings/keys`. The left sidebar contains several navigation links, and the main content area displays an 'Authentication Keys' section with one entry: 'lilichengcheng\_ssh\_key'. Below this is a 'GPG keys' section stating 'There are no GPG keys associated with your account.' At the bottom of the sidebar, there is a link labeled 'Developer settings' with a red arrow pointing to it.

SSH and GPG keys

Appearance

Accessibility

Notifications

Access

Billing and plans

Emails

Password and authentication

**SSH and GPG keys**

Organizations

Moderation

Code, planning, and automation

Repositories

Packages

GitHub Copilot

Pages

Saved replies

Security

Code security and analysis

Integrations

Applications

Scheduled reminders

Archives

Security log

Sponsorship log

<> Developer settings

SSH and GPG keys

lilichengcheng\_ssh\_key

SHA256:j2dL8AVCvGTuEiV1xHLBMrNFieXHC7lGNwAXB/5RaYs

Added on Sep 20, 2022

Never used — Read/write

Delete

Check out our guide to generating SSH keys or troubleshoot common SSH problems.

GPG keys

New GPG key

There are no GPG keys associated with your account.

Learn how to [generate a GPG key and add it to your account](#).

Vigilant mode

**Flag unsigned commits as unverified**

This will include any commit attributed to your account but not signed with your GPG or S/MIME key.  
Note that this will include your existing unsigned commits.

[Learn about vigilant mode](#).

# Obtain your “personal access token” (个人访问令牌)

Chrome File Edit View History Bookmarks Profiles Tab Window Help

github.com/settings/tokens

Google GitHub Annotation HiC Database Statistics iCommons Gene\_family\_expa... Divergent time WGD JCVI TE dn/ds LTR RGB颜色值与十六... C (12条消息) 高质量... R语言 PCA分析 | Other Bookmarks

Search or jump to... Pull requests Issues Marketplace Explore

Settings / Developer settings

GitHub Apps OAuth Apps Personal access tokens

Personal access tokens

Generate new token

Need an API token for scripts or testing? Generate a personal access token for quick access to the GitHub API.

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication.

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# Obtain your “personal access token” (个人访问令牌)

The screenshot shows a Mac OS X desktop with a Chrome browser window open to [github.com/settings/tokens/new](https://github.com/settings/tokens/new). The browser's address bar also displays [github.com](https://github.com). The page title is "New personal access token".

**Left sidebar:**

- GitHub Apps
- OAuth Apps
- Personal access tokens** (selected)

**Main content area:**

### New personal access token

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to [authenticate to the API over Basic Authentication](#).

**Note**

←

What's this token for?

**Expiration \***

The token will expire on Thu, Oct 20 2022

**Select scopes** ←

Scopes define the access for personal tokens. [Read more about OAuth scopes.](#)

<input checked="" type="checkbox"/> <b>repo</b>	Full control of private repositories
<input checked="" type="checkbox"/> <b>repo:status</b>	Access commit status
<input checked="" type="checkbox"/> <b>repo_deployment</b>	Access deployment status
<input checked="" type="checkbox"/> <b>public_repo</b>	Access public repositories
<input checked="" type="checkbox"/> <b>repo:invite</b>	Access repository invitations
<input checked="" type="checkbox"/> <b>security_events</b>	Read and write security events
<input checked="" type="checkbox"/> <b>workflow</b>	Update GitHub Action workflows
<input checked="" type="checkbox"/> <b>write:packages</b>	Upload packages to GitHub Package Registry
<input checked="" type="checkbox"/> <b>read:packages</b>	Download packages from GitHub Package Registry
<input checked="" type="checkbox"/> <b>delete:packages</b>	Delete packages from GitHub Package Registry
<input checked="" type="checkbox"/> <b>admin:org</b>	Full control of orgs and teams, read and write org projects
<input checked="" type="checkbox"/> <b>write:org</b>	Read and write org and team membership, read and write org projects
<input checked="" type="checkbox"/> <b>read:org</b>	Read org and team membership, read org projects
<input checked="" type="checkbox"/> <b>manage_runners:org</b>	Manage org runners and runner groups

<https://github.com/settings/tokens>

# Obtain your “personal access token” (个人访问令牌)

The screenshot shows a Mac OS X desktop with a Chrome browser window open to [github.com/settings/tokens/new](https://github.com/settings/tokens/new). The title bar says "New Personal Access Token". The main content is a list of GitHub API permissions with checkboxes. A red arrow points from the bottom left towards the "Generate token" button.

<input checked="" type="checkbox"/> <a href="#">read:repo_hook</a>	Read repository hooks
<input checked="" type="checkbox"/> <a href="#">admin:org_hook</a>	Full control of organization hooks
<input checked="" type="checkbox"/> <a href="#">gist</a>	Create gists
<input checked="" type="checkbox"/> <a href="#">notifications</a>	Access notifications
<input checked="" type="checkbox"/> <a href="#">user</a>	Update ALL user data
<input checked="" type="checkbox"/> <a href="#">read:user</a>	Read ALL user profile data
<input checked="" type="checkbox"/> <a href="#">user:email</a>	Access user email addresses (read-only)
<input checked="" type="checkbox"/> <a href="#">user:follow</a>	Follow and unfollow users
<input checked="" type="checkbox"/> <a href="#">delete_repo</a>	Delete repositories
<input checked="" type="checkbox"/> <a href="#">write:discussion</a>	Read and write team discussions
<input checked="" type="checkbox"/> <a href="#">read:discussion</a>	Read team discussions
<input checked="" type="checkbox"/> <a href="#">admin:enterprise</a>	Full control of enterprises
<input checked="" type="checkbox"/> <a href="#">manage_runners:enterprise</a>	Manage enterprise runners and runner groups
<input checked="" type="checkbox"/> <a href="#">manage_billing:enterprise</a>	Read and write enterprise billing data
<input checked="" type="checkbox"/> <a href="#">read:enterprise</a>	Read enterprise profile data
<input checked="" type="checkbox"/> <a href="#">project</a>	Full control of projects
<input checked="" type="checkbox"/> <a href="#">read:project</a>	Read access of projects
<input checked="" type="checkbox"/> <a href="#">admin:gpg_key</a>	Full control of public user GPG keys
<input checked="" type="checkbox"/> <a href="#">write:gpg_key</a>	Write public user GPG keys
<input checked="" type="checkbox"/> <a href="#">read:gpg_key</a>	Read public user GPG keys
<input checked="" type="checkbox"/> <a href="#">admin:ssh_signing_key</a>	Full control of public user SSH signing keys
<input checked="" type="checkbox"/> <a href="#">write:ssh_signing_key</a>	Write public user SSH signing keys
<input checked="" type="checkbox"/> <a href="#">read:ssh_signing_key</a>	Read public user SSH signing keys

[Generate token](#)   [Cancel](#)



# Obtain your “personal access token” done!

ghp\_QfCBCAwDHhb6mVl9xqHZ7qvOyZxVVc1zJPey

Some of the scopes you've selected are included in other scopes. Only the minimum set of necessary scopes has been saved.

Settings / Developer settings

GitHub Apps

OAuth Apps

Personal access tokens

Personal access tokens

Generate new token Revoke all

Tokens you have generated that can be used to access the GitHub API.

Make sure to copy your personal access token now. You won't be able to see it again!

✓ ghp\_QfCBCAwDHhb6mVl9xqHZ7qvOyZxVVc1zJPey ⌂ ↶ Delete

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to [authenticate to the API over Basic Authentication](#).

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Do something under your “first\_repo”

Configure user information (配置用户信息):

**git config --global user.name “lilichengcheng”**

**git config --global user.email “licheng@caas.cn”**

```
[licheng@trainning first_repo]$ git config --global user.name "lilichengcheng" ←
[licheng@trainning first_repo]$
[licheng@trainning first_repo]$ git config --global user.email "licheng@caas.cn" ←
```

Do something under your “first\_repo”

配置网络代理：

**git config --global --unset http.proxy**

**git config --global --unset https.proxy**

```
[licheng@trainning first_repo]$ git config --global --unset http.proxy
[licheng@trainning first_repo]$
[licheng@trainning first_repo]$ git config --global --unset https.proxy
[licheng@trainning first_repo]$
```

Do something under your “first\_repo”

touch learning\_git.txt

vi learning\_git.txt

```
[licheng@trainning first_repo]$ cat learning_git.txt ←  
#### Learning git  
  
**Today is wednesday! We have a bioinfo class.**  
  
*hello bioinfo!*  
[licheng@trainning first_repo]$ █
```

Do something under your “first\_repo”

从远程仓库拉取更新数据（pull）：

**git pull origin main**

```
[licheng@trainning first_repo]$ git pull origin main ←
fatal: unable to access 'https://github.com/lilichengcheng/first_repo.git/': HTTP/2 stream 1 was not closed cleanly before end of the underlying stream
[licheng@trainning first_repo]$ git config --global --unset http.proxy ←
[licheng@trainning first_repo]$ git config --global --unset https.proxy ←
[licheng@trainning first_repo]$ git pull origin main ←
From https://github.com/lilichengcheng/first_repo
 * branch            main      -> FETCH_HEAD
Already up to date.
[licheng@trainning first_repo]$
```

Do something under your “first\_repo”

将指定文件标记为将要提交的文件：

**git add .**

**git add learning\_git.txt**

```
[licheng@trainning first_repo]$ git add learning_git.txt ←  
[licheng@trainning first_repo]$ █
```

Do something under your “first\_repo”

创建一个提交并提供提交信息 (snapshot) :

**git commit -m “2022-09-21”**

```
[licheng@trainning first_repo]$ git commit -m "2022-09-21" ←
[main fa139e3] 2022-09-21
 1 file changed, 5 insertions(+)
  create mode 100644 learning_git.txt
[licheng@trainning first_repo]$ █
```

Do something under your “first\_repo”

## 向远程仓库推送 (push)

**git push origin main**

Username: lilichengcheng

Access token: ghp\_QfCBCAwDHhb6mVl9xqHZ7qvOyZxVVc1zJPey

```
[licheng@trainning first_repo]$ git push origin main ←
Username for 'https://github.com': lilichengcheng ←
Password for 'https://lilichengcheng@github.com': ←
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 16 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 356 bytes | 356.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/lilichengcheng/first_repo.git
  3f31e02..fa139e3  main -> main
[licheng@trainning first_repo]$ █
```

# SUMMARY

**Create the repository on the cloud:**

git clone \*\*\*

git pull origin main

git add .

git commit -m “edits to the file”

git pull origin mian

git push origin main

# WHAT WILL YOU LEARN THROUGH THIS CLASS?

- Understand what is git, why we use git, and how
- Copy the Github repository of our course material to your local computer, and update it by “git pull origin main”
- Create your own GitHub repository for your group, share with group members and add at least one markdown file into it.

Optional: set up a personal webpage with GitHub template

# HOMOWORK

**create the repository in the local:**

- git init
- git add README.md
- git commit -m “first commit”
- git remote add origin git@github.com:username/IamGreat.git
- git push origin main