

创新培训 - Git 基本使用

Version control 版本管理

- VCS: Version Control System
- A VCS is a must for code collaboration in a team.

What is git?

- Created by Linus Torvalds, creator of Linux.
- Git is a distributed version control system. Users keep entire code and history in their local machine. So that, users can make changes without internet access.

Prerequisites

- Git installed
 - Windows: <https://git-scm.com/downloads>
 - MacOS: preinstalled after OS X 10.9
 - Linux: by yourself ♥ □
- An [GitHub](#) account, **or any other providers** ([gitee](#), [coding.net](#), ...) if you can't access GitHub



How does git work ?

Key Concepts: Commit - 提交

- Commit is a snapshot of your code in the repository.
- It contains pieces of information:
 - Information about how files are changed from previously
 - A reference to the commit that came before it (parent commit)
 - A hash code name like
282adc74d33b5eef1b57df3cf115af59ce1a9527
 - A message about how things are changed
 - Author's name & email
- Use `git log` to see commit logs.

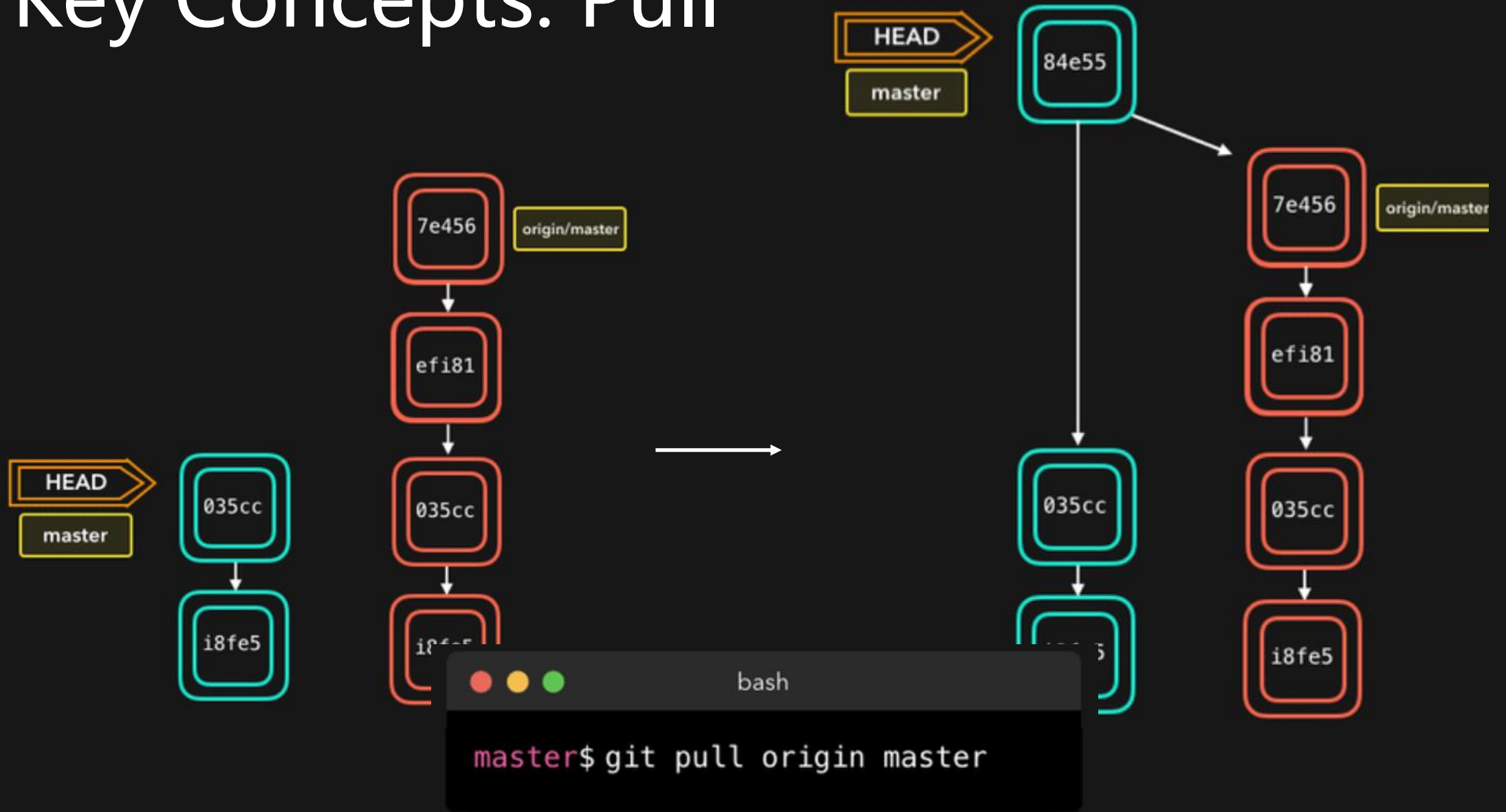
Key Concepts: Repositories - 仓库

- Or called `repo` shortly.
- Consists of all your commits and can live on a local machine or a remote server (GitHub ..)
- The act of copying a repository from a remote server is called **cloning**
- The process of downloading commits that don't exist on your machine from a remote repository is called **pulling** changes

Key Concepts: Branches - 分支

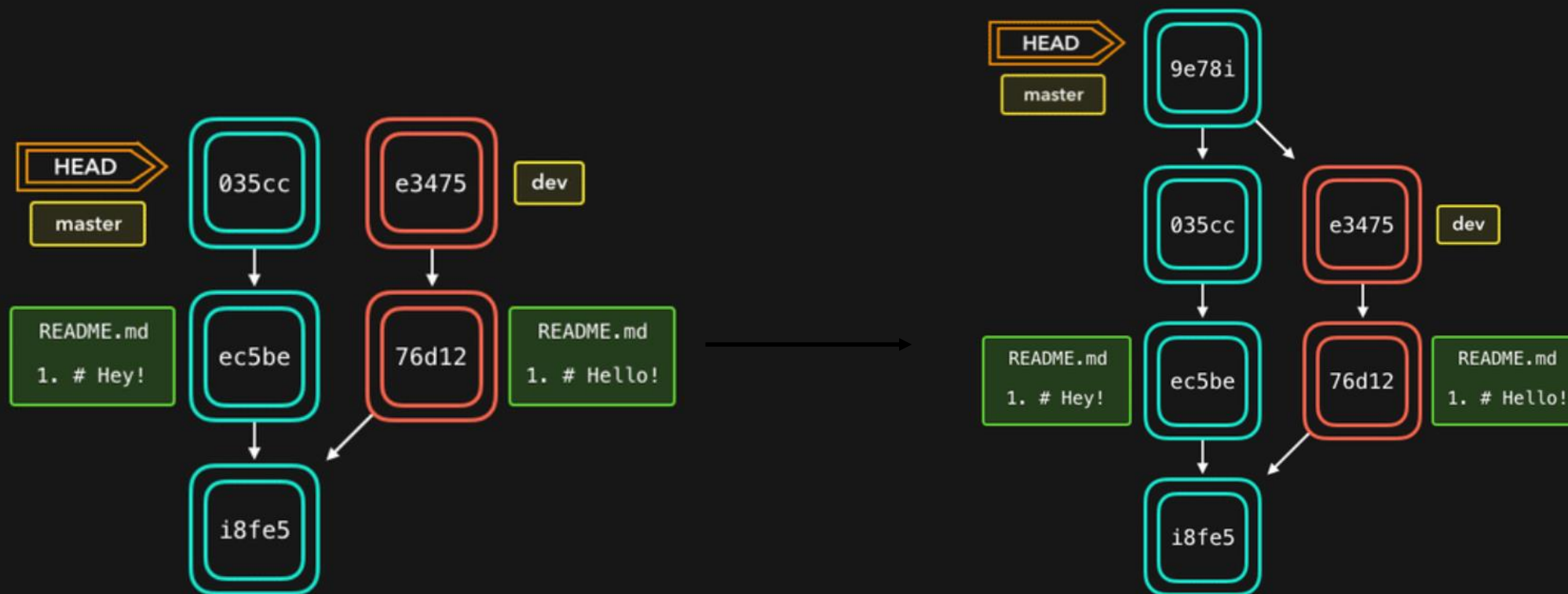
- All commits in git live on branch
- A repository can contain many branches
- The main branch in a project is called the master (or main) branch

Key Concepts: Pull



Key Concepts: Merging - 合并

- Once you are done with your feature, you merge it back into master



Merge Conflicts 冲突

master

```
1 # Hey!
```

```
2
```

```
3 Welcome to the README of  
4 this amazing project
```

dev

```
1 # Hello!
```

```
2
```

```
3 Welcome to the README of  
4 this amazing project
```

Tutorial 1: setup Git repo & push first commit

- In this tutorial, we will explore how to create a new public repository in GitHub.
- Any other Git providers (gitee, coding.net, ...) **are encouraged** if you have trouble with GitHub (slow network speed or other problems).

Setup key pairs ([detailed tutorial](#))

```
root@9379b8b7b26c:/# # make sure you have git installed
root@9379b8b7b26c:/# git version
git version 2.25.1
root@9379b8b7b26c:/# # generate a new keypair
root@9379b8b7b26c:/# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Created directory '/root/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:rIzjtRFehpEpxm/aezkkUe87BKEChj/2SNOGTvjh/Ss root@9379b8b7b26c
The key's randomart image is:
+---[RSA 3072]---+
| .                |
| |. o.   oo       |
| | + ++ +o o      |
| |. X.+oo+. .     |
| | B 0 .=.So      |
| | = oB.=. o      |
| |  +.Bo o .      |
| | .Eo.++ o       |
| | ..+o . .       |
+---[SHA256]-----+
root@9379b8b7b26c:/# cat ~/.ssh/id_rsa.pub # you can see your public key generated below
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGC/zAzNskSWnwXmDM0+DPExTDWzL+7gVG+3A70I86szZwejj86HAeDp7je8X6lsybmX1pQcyID9yxvoPeNf3kJMMDi/K3gK3WatihlM
nQzdm5/jXrt5I+R5XMH8xNs47AAFys8t43a7VKXJsn3XZ/DAHocG4KhSDbGXU/4MpmhRGtp2Lv3PfNrokcSl8npi6dzAZiW3q0cm+PGYPyiJrn2xMYdD/5qLfpnlb3JAmKW2p+hieav7
SK0hMKHmpLt0P0Po+0uX3/cEFnlPZ09i2Ent3EZkX+t6Uj90mqU++/b1jII92KCNaPb/eQ/jINkxDSMMI4emrb1YbE1d03j56mFC63DZnmRDBukwebF6kLNNn5d6CbkTwWQsGJ36fCM
root@9379b8b7b26c:/#
```

`git version`: check if you have git installed.

`ssh-keygen`: generate a new key pair.

`cat xxx_file`: show xxx_file's content.

Setup key pairs

Add your public key in your Git provider account.

The screenshot shows the GitHub web interface. At the top is a dark navigation bar with the GitHub logo, a search bar, and links for Pull requests, Issues, Marketplace, and Explore. Below this is a header section with the user's profile picture, a thinking face emoji, and the text 'Your personal account' with a 'Switch to another account' link. A 'Go to your personal profile' button is also present. On the left is a sidebar menu with various settings categories. The 'SSH and GPG keys' option is highlighted with a red box and the number '2'. The main content area is titled 'SSH keys' and contains a list of existing SSH keys, each with a 'Delete' button. A green 'New SSH key' button is highlighted with a red box and the number '3'. On the right side, a dropdown menu is open, showing options like 'Your profile', 'Your repositories', etc. The 'Settings' option is highlighted with a red box and the number '1'.

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

Signed in as [username]

Go to your personal profile

Your personal account Switch to another account

Account settings

- Profile
- Account
- Appearance
- Account security
- Billing & plans
- Security log
- Security & analysis
- Sponsorship log
- Emails
- Notifications
- Scheduled reminders
- SSH and GPG keys 2**
- Repositories
- Packages

SSH keys

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

[blurred key]	Delete
[blurred key]	Delete
[blurred key]	Delete
[blurred key]	Delete

New SSH key 3

- Signed in as [username]
- Focusing
- Your profile
- Your repositories
- Your codespaces
- Your organizations
- Your projects
- Your stars
- Your gists
- Upgrade
- Feature preview
- Help
- Settings 1**
- Sign out

```
| .Eo.++ o |
| ..+o . . |
+----[SHA256]-----+
s root@9379b8b7b26c:/# cat ~/.ssh/id_rsa.pub # you can see your public key generated below
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQGC/zAzNskSWnwXmDM0+DPEXTDWzL+7gVG+3A7OI86szZwejj86HAeDp7je8X6lsybm
X1pQcyID9yxvoPeNf3kJMMDi/K3gK3WatihLMjeWWv1iogwZGPJcrn+RNINjuKIOS6HLmfbK6C/YSnvD0uL0e/w4JevaduTMnQzdm5/
jXrt5I+R5XMH8xNs47AAFys8t43a7VKXJsn3XZ/DAHocG4KhSDbGXU/4MpmhRGtp2Lv3PfNrokcSl8npi6dzAZiW3q0cm+PGYPyiJrn
2xMYdD/5qLfplb3JAmKW2p+hieav7MmTHOaRad+l1UIFhRhXOJugpGagrqSfRNo76/kRBIUEib9ngWuRzNbRvm8mSK0hMKHMPt0PO
Po+0uX3/cEFnlPZ09i2Ent3EZkX+t6Uj90mqU++/b1jII92KCNaPb/eQ/jINkxDSMMI4emrb1YbE1d03j56mFC63DZNMrdBukwebF6
kLNnn5d6CbKtwWQsGJ36fCMHjiIkV9V6we98= root@9379b8b7b26c
```

SSH keys / Add new

Title

laptop

Key

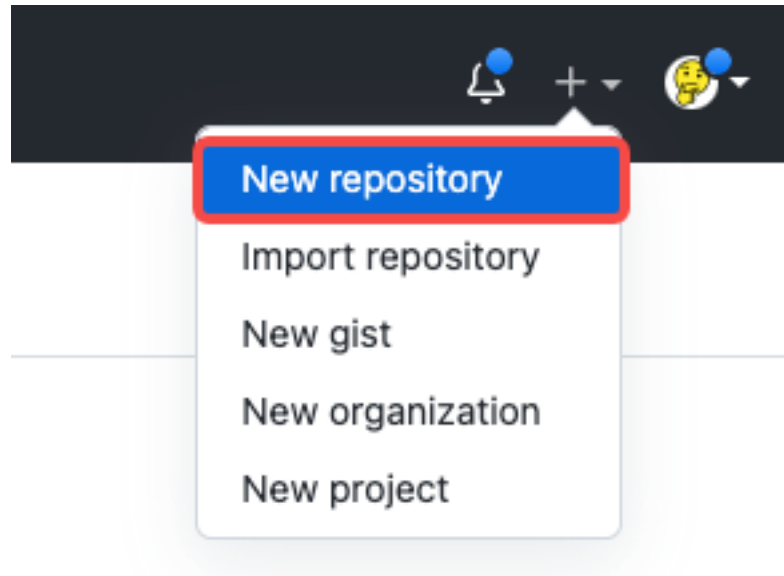
```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQGC/zAzNskSWnwXmDM0+DPEXTDWzL+7gVG+3A7OI86szZwejj86HA
eDp7je8X6lsybmX1pQcyID9yxvoPeNf3kJMMDi/K3gK3WatihLMjeWWv1iogwZGPJcrn+RNINjuKIOS6HLmfbK6C/
YSnvD0uL0e/w4JevaduTMnQzdm5/jXrt5I+R5XMH8xNs47AAFys8t43a7VKXJsn3XZ/DAHocG4KhSDbGXU/4M
pmhRGtp2Lv3PfNrokcSl8npi6dzAZiW3q0cm+PGYPyiJrn2xMYdD/5qLfplb3JAmKW2p+hieav7MmTHOaRad+l
1UIFhRhXOJugpGagrqSfRNo76/kRBIUEib9ngWuRzNbRvm8mSK0hMKHMPt0POPo+0uX3/cEFnlPZ09i2Ent3E
ZkX+t6Uj90mqU++/b1jII92KCNaPb/eQ/jINkxDSMMI4emrb1YbE1d03j56mFC63DZNMrdBukwebF6kLNnn5d6
CbKtwWQsGJ36fCMHjiIkV9V6we98= root@9379b8b7b26c
```

Add SSH key

Check whether key pair is configured correctly

```
root@9379b8b7b26c:/# ssh git@github.com
The authenticity of host 'github.com (20.205.243.166)' can't be established.
RSA key fingerprint is SHA256:nThbg6kXUpJWGl7E1IGOCspRomTxdCARLviKw6E5SY8.
Are you sure you want to continue connecting (yes/no/[fingerprint]): yes
Warning: Permanently added 'github.com,20.205.243.166' (RSA) to the list of known hosts.
PTY allocation request failed on channel 0
Hi [REDACTED]! You've successfully authenticated but GitHub does not provide shell access.
Connection to github.com closed.
```


Create a new repository



Fill the name & make it publi

Create a new repository

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

Repository template

Start your repository with a template repository's contents.

No template ▾

Owner *

heymind ▾

Repository name *

first_repo ✓

Great repository names first_repo is available. Need inspiration? How about [congenial-octo-system?](#)

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.](#)


☐ Choose a license

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

Create repository

Follow the instructions in command line

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

 Set up in Desktop

or

HTTPS

SSH

git@github.com:l[redacted] first_repo.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 "# first_repo" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin git@github.com:[redacted]/first_repo.git
git push -u origin main
```



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

```
git remote add origin git@github.com:heyminid/first_repo.git
git branch -M main
git push -u origin main
```



...or import code from another repository

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

Import code

Configure your Git user name & email

```
root@9379b8b7b26c:/# # configure your email & username  
root@9379b8b7b26c:/# git config --global user.name "Your Name"  
root@9379b8b7b26c:/# git config --global user.email "you@example.com"  
root@9379b8b7b26c:/# █
```

Please do NOT use the example user name & email.

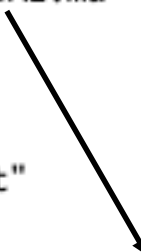
Initial commit

[git](#)
[init](#)

[git add](#)

[git commit](#)


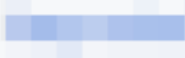
```
root@9379b8b7b26c:~# cd ~
root@9379b8b7b26c:~# mkdir first_repo # create a folder
root@9379b8b7b26c:~# cd first_repo/ # enter the folder
root@9379b8b7b26c:~/first_repo# echo "# first_repo" >> README.md
root@9379b8b7b26c:~/first_repo# git init
Initialized empty Git repository in /root/first_repo/.git/
root@9379b8b7b26c:~/first_repo# git add README.md
root@9379b8b7b26c:~/first_repo# git commit -m "first commit"
[master (root-commit) 9117eff] first commit
1 file changed, 1 insertion(+)
create mode 100644 README.md
```



Replace with your student ID here!
For example, echo "2021111111" >>
README.md

Check the result in the repo home page


The screenshot shows the GitHub interface for a repository named 'first_repo'. At the top, the repository name is displayed with a 'Public' badge. Below this is a navigation bar with links to Code, Issues, Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. The 'Code' tab is selected. Under the navigation bar, there are buttons for 'main' (selected), '1 branch', and '0 tags'. To the right are buttons for 'Go to file', 'Add file', and a green 'Code' button. Below this is a commit history section showing a single commit by 'Your Name' with the message 'first commit', commit hash 'ada21c0', and time '6 minutes ago'. Below the commit history is a file list showing 'README.md' with the message 'first commit' and time '6 minutes ago'. The 'README.md' file content is displayed below, showing the text 'first_repo'.


  / **first_repo** Public

[Code](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#) [Settings](#)

[main](#) [1 branch](#) [0 tags](#) [Go to file](#) [Add file](#) [Code](#)

Your Name first commit ada21c0 6 minutes ago [1 commit](#)

 README.md first commit 6 minutes ago

README.md 

first_repo

Tutorial 2: create a Pull requests

- Check out a new branch [git checkout](#)

```
root@9379b8b7b26c:~/first_repo# git checkout -b branch2  
Switched to a new branch 'branch2'
```

- Make some changes

```
root@9379b8b7b26c:~/first_repo# echo "some changes" >> README.md  
root@9379b8b7b26c:~/first_repo# cat README.md  
# first_repo  
some changes
```

- Add & commit these changes

```
root@9379b8b7b26c:~/first_repo# git add ./README.md  
root@9379b8b7b26c:~/first_repo# git commit -m'do some changes'  
[branch2 c0572a7] do some changes  
1 file changed, 1 insertion(+)
```

Push the branch to remote

[git push](#)

```
root@9379b8b7b26c:~/first_repo# git push --set-upstream origin branch2
Enumerating objects: 6, done.
Counting objects: 100% (6/6), done.
Delta compression using up to 16 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (6/6), 459 bytes | 459.00 KiB/s, done.
Total 6 (delta 0), reused 0 (delta 0)
remote:
remote: Create a pull request for 'branch2' on GitHub by visiting:
remote: https://github.com/heyminde/first\_repo/pull/new/branch2
remote:
To github.com:heyminde/first_repo.git
 * [new branch]      branch2 -> branch2
Branch 'branch2' set up to track remote branch 'branch2' from 'origin'.
```

Follow this link to create a PR

Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).



base: main ▾



compare: branch2 ▾

✓ **Able to merge.** These branches can be automatically merged.



do some changes

Write

Preview

H B I ≡ <> 🔗 ≡ ½ ≡ ☑ @ ↗ ↶


Leave a comment

Attach files by dragging & dropping, selecting or pasting them.



Create pull request



 Remember, contributions to this repository should follow our [GitHub Community Guidelines](#).

do some changes #1



heymind wants to merge 1 commit into `main` from `branch2`



Conversation 0



Commits 1



Checks 0



Files changed 1



heymind commented now

Owner



No description provided.



do some changes

c0572a7

Add more commits by pushing to the **branch2** branch on **heymind/first_repo**.



Continuous integration has not been set up

[GitHub Actions](#) and [several other apps](#) can be used to automatically catch bugs and enforce style.



This branch has no conflicts with the base branch

Merging can be performed automatically.

Merge pull request




You can also [open this in GitHub Desktop](#) or view [command line instructions](#).


You will see this PR is merged


<> Code


⦿ Issues


 Pull requests 1

▶ Actions


 Projects

 Wiki

 Security


 Insights

Filters ▾

 is:pr is:closed

✕ Clear current search query, filters, and sorts

☐

 0 Open


☒ 1 Closed

Author ▾


Label ▾

Projects

☐



do some changes

#1 by  was merged 12 seconds ago

Assignment: collaborate with others using Git

- You can make a PR in your classmates' repository and get it merged.
- Or any other methods that could let your commit appear in another repository.

Submit your repository

- Total 10 points
 - 6 points if you attend class and finish Tutorial 1
 - +2 points if you finish Tutorial 2
 - +2 points if you finish the assignment
 - +5 extra points if you (will not exceed 25 points assigned by 蓝图)
 - Setup [GitHub Actions](#) (or other CI/CD) for your real-world repository
 - **Or** contribute to any popular open-source project (stars > 1k)

Submit your repository

- Please make sure a README.md is in your repository and contains your student ID.
- A script is used to give the points according to your submission.
- Please submit your repository **URL** at <https://wj.qq.com/s2/9130720/27df/> before **December 20**.

Ref.

- <https://dev.to/lydiahallie/cs-visualized-useful-git-commands-37p1>
- <https://www.slideshare.net/HubSpot/git-101-git-and-github-for-beginners>

创新讲座、创新培训、双创对接会评分细则

- 双创对接会 10 分
 - 4分：线上签到、签退
 - 3分：线下签到
 - 3分：成功**组队**
- 创新培训 10 分
- 创新讲座 5 分（邀请趣公益、邮纸、助顺邮我等团队分享项目经验）
 - 5分: 出勤 & 互动

总计 25 分