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
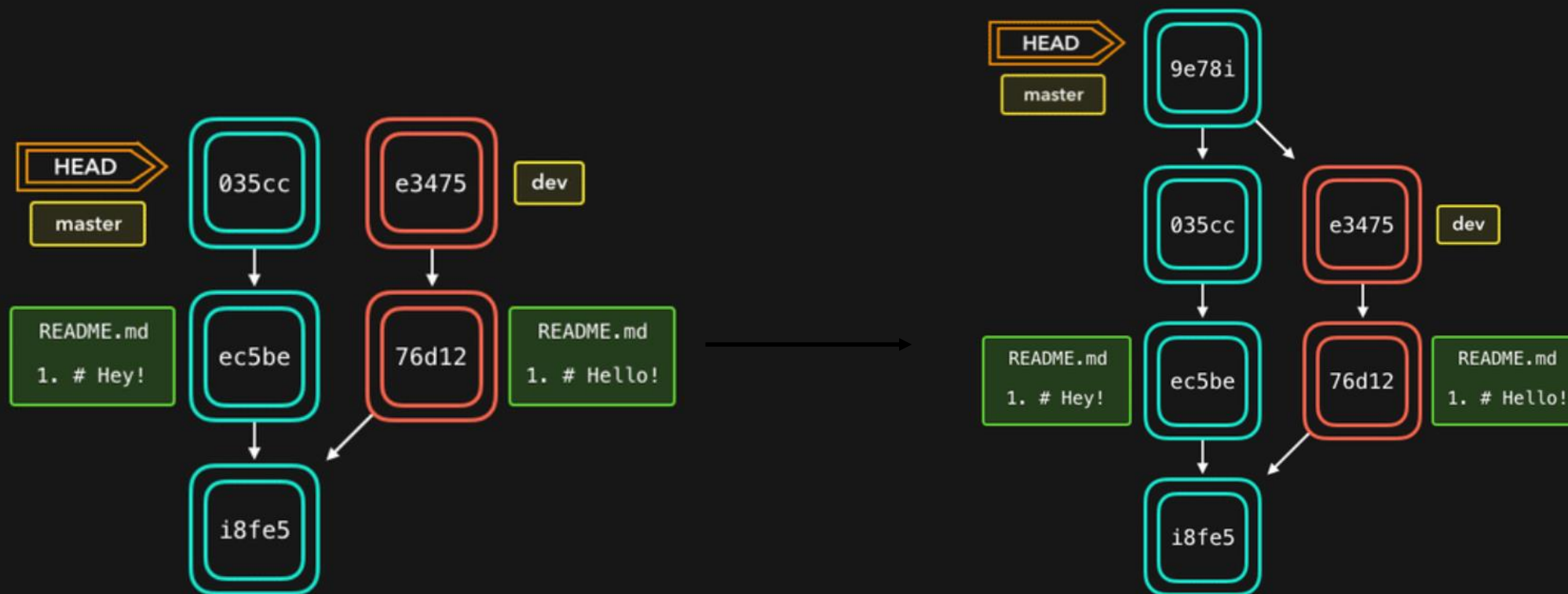
Key Concepts: Branches - 分支

- 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
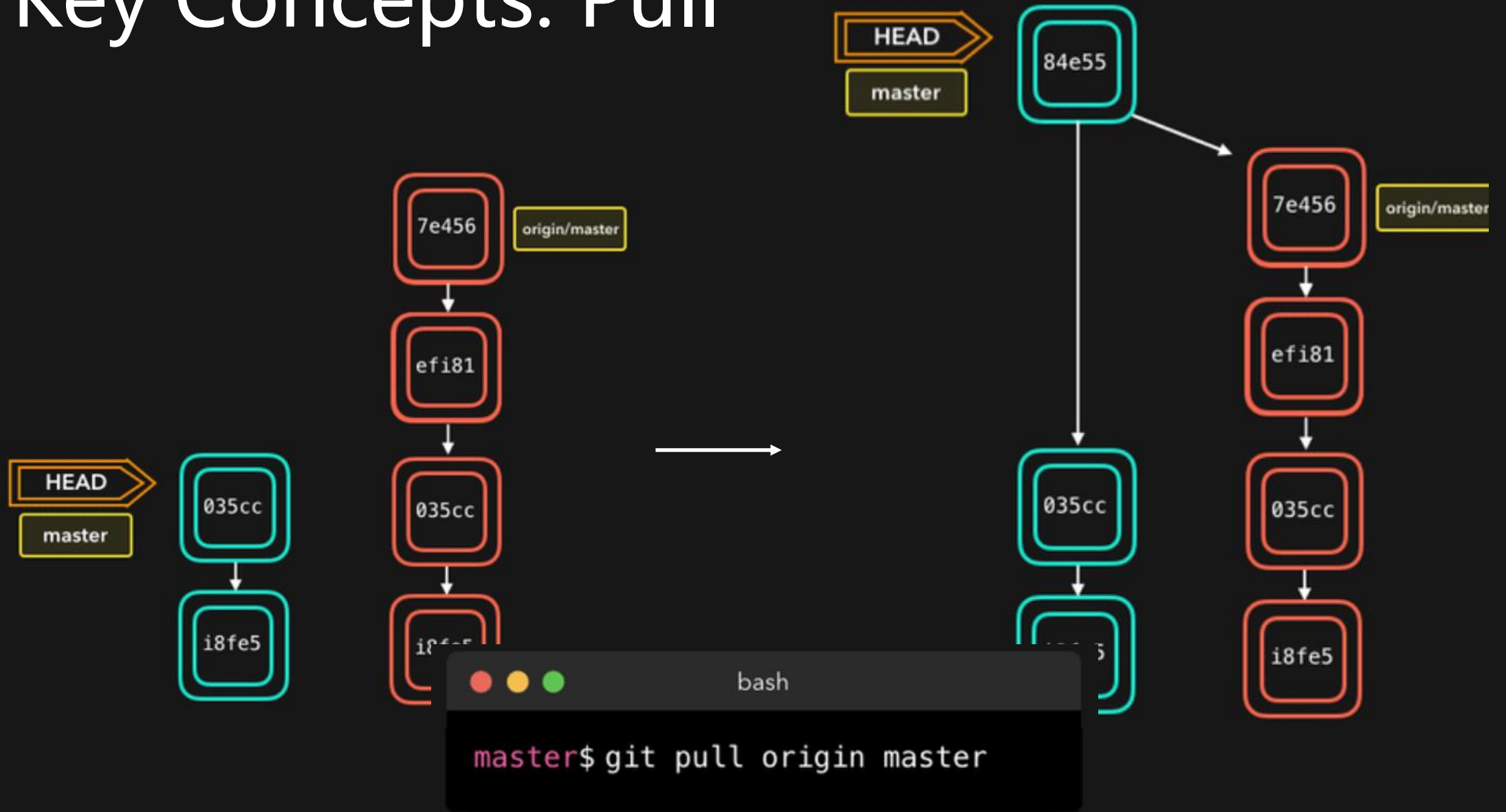
Key Concepts: Merging - 合并

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

Merge Conflicts 冲突

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](#))

Setup key pairs

Add your public key in your Git provider account.

```
    | .Eo.++ o       |
    |  ..+o . .       |
    +----[SHA256]-----+
root@9379b8b7b26c:/# cat ~/.ssh/id_rsa.pub # you can see your public key generated below
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABgQC/zAzNskSWnwXmDM0+DPExTDWzL+7gVG+3A7OI86szZwejj86HAeDp7je8X6lsybm
X1pQcyID9yxvoPeNf3kJMMDi/K3gK3WatihlMjeWWv1iogwZGPJcrn+RNlNjuKlOS6HLmfbK6C/YSnvD0uL0e/w4JevaduTMnQzdm5/
jXrt5I+R5XMH8xNs47AAFys8t43a7VKXJsn3XZ/DAHocG4KhSDbGXU/4MpmhRGtp2Lv3PfNrokcSl8npi6dzAZiW3q0cm+PGYPyiJrn
2xMYdD/5qLfpnlb3JAmKW2p+hieav7MmTHOaRad+l1UIFhRhXOJugpGqgrqSfRNo76/kRBIUEib9ngWuRzNbRvm8mSK0hMKHMpLt0PO
Po+0uX3/cEFnlPZ09i2Ent3EZkX+t6Uj90mqU++/b1jII92KCNaPb/eQ/jINkxDaSMMI4emrb1YbE1d03j56mFC63DZNmRDBukwebF6
kLNnn5d6CbkTwWQsGJ36fCMHjiIkV9V6we98= root@9379b8b7b26c
root@9379b8b7b26c:/#
```

SSH keys / Add new

Title

laptop

Key

```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABgQC/zAzNskSWnwXmDM0+DPExTDWzL+7gVG+3A7OI86szZwejj86HA
eDp7je8X6lsybmX1pQcyID9yxvoPeNf3kJMMDi/K3gK3WatihlMjeWWv1iogwZGPJcrn+RNlNjuKlOS6HLmfbK6C/
YSnvD0uL0e/w4JevaduTMnQzdm5/jXrt5I+R5XMH8xNs47AAFys8t43a7VKXJsn3XZ/DAHocG4KhSDbGXU/4M
pmhRGtp2Lv3PfNrokcSl8npi6dzAZiW3q0cm+PGYPyiJrn2xMYdD/5qLfpnlb3JAmKW2p+hieav7MmTHOaRad+l
1UIFhRhXOJugpGqgrqSfRNo76/kRBIUEib9ngWuRzNbRvm8mSK0hMKHMpLt0POPo+0uX3/cEFnlPZ09i2Ent3E
ZkX+t6Uj90mqU++/b1jII92KCNaPb/eQ/jINkxDaSMMI4emrb1YbE1d03j56mFC63DZNmRDBukwebF6kLNnn5d6
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      ! You've successfully authenticated  but GitHub does not provide shell access.
Connection to github.com closed.
```

Create a new repository
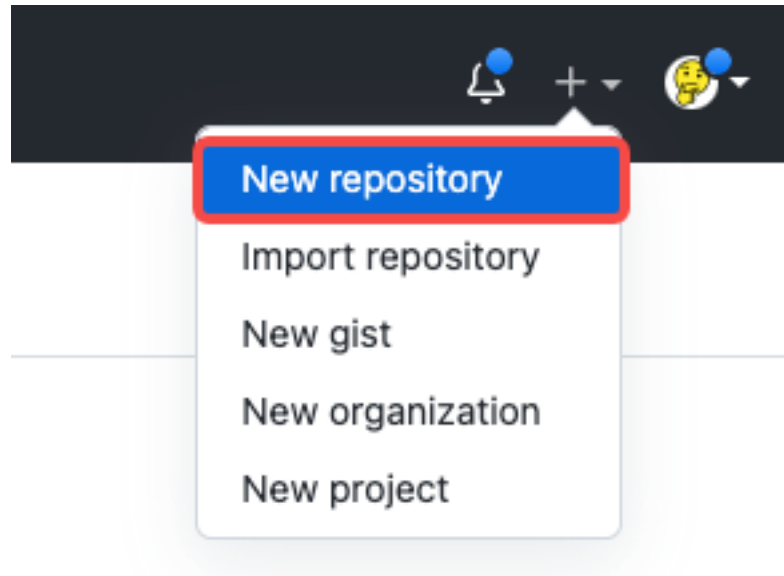
Fill the name
& make it publi

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 *   **Repository name** *

🤔 heymind ▾ / first_repo ✓

Great repository names   first_repo is available. able. 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:▓▓▓▓ 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:▓▓▓▓d/first_repo.git
git push -u origin main
```

…or push an existing repository from the command line

```
git remote add origin git@github.com:heymind/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.

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:/#
```
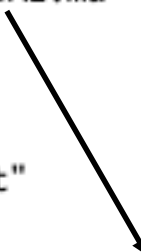
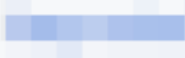Please do NOT use the example user name & email.

Initial commit

```
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

<> Code   ⊙ Issues   ⌥ Pull requests   ▶ Actions   🗔 Projects   📖 Wiki   🛡 Security   📈 Insights   ⚙ Settings

🎋 main ▾   ⵙ 1 branch   ◌ 0 tags   Go to file   Add file ▾   Code ▾

Your Name first commit   ada21c0 6 minutes ago   �途 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/heymind/first_repo/pull/new/branch2
remote:
To github.com:heymind/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

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

🔀 Open   **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 35 分