

Introduction to Git

Database Systems
DataLab, CS, NTHU
Spring, 2021

Outline

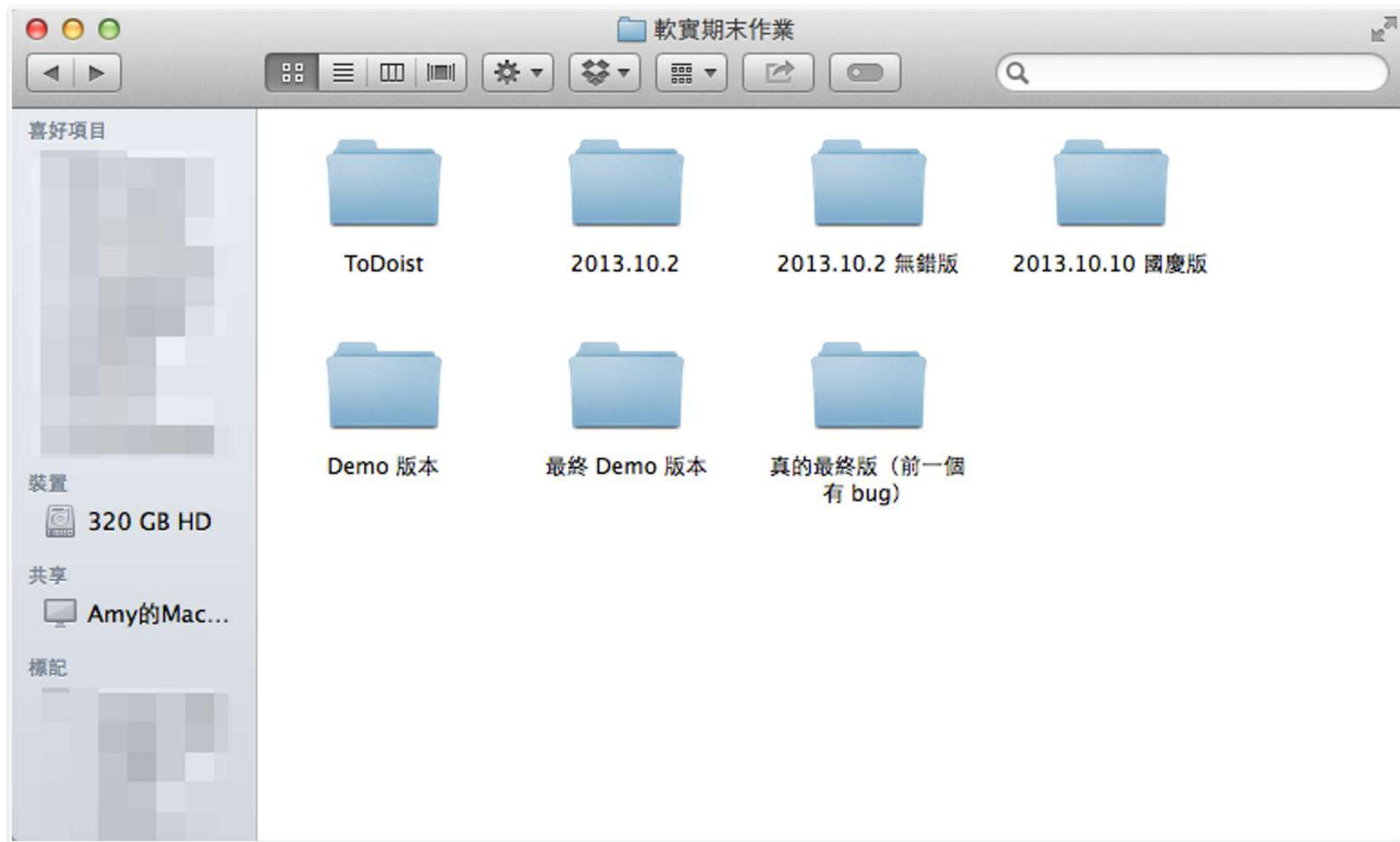
- Version control system
- Git basics
- Git branch
- Remote repository

Outline

- Version control system
- Git basics
- Git branch
- Remote repository

Why Version Control ?

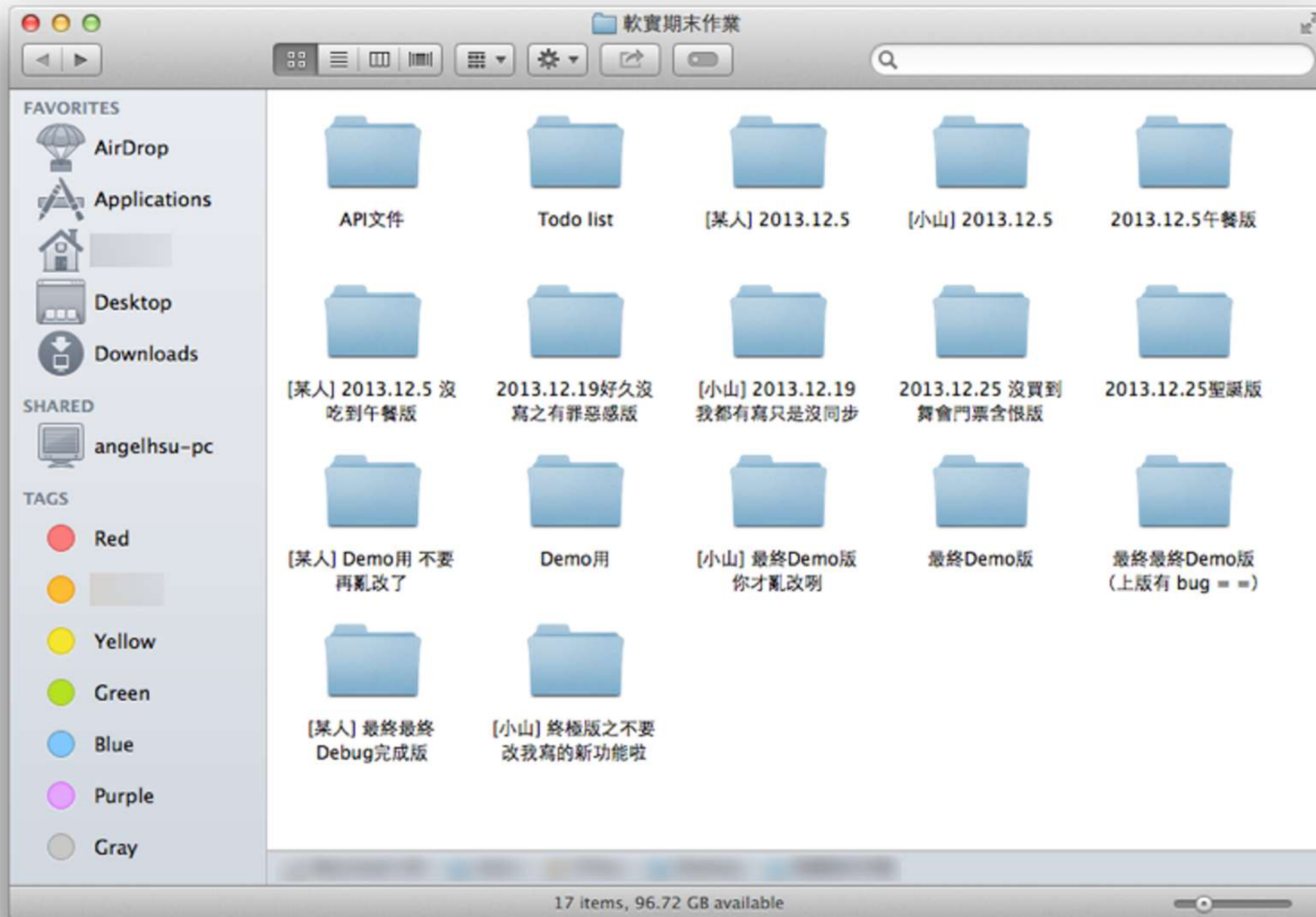
Students' VCS



How to work with others?



Dropbox VCS in Reality



Version Control System

- Store the projects, keep your **revision history**
- **Synchronization** between modifications made by different developers

Outline

- Version control system
- **Git basics**
- Git branch
- Remote repository

Git

- Git is a version control system which is
 - Fast
 - Easy to use
 - Distributed
 - Able to handle large project
(ex. Linux Kernel 27.8 million lines)
- A git repository is a mini database that tracks your files

Installation

- Please check this link
 - <http://git-scm.com/book/en/Getting-Started-Installing-Git>

Configuration

- Modify `~/.gitconfig`
- Or, type in following commands

```
git config --global user.name "your name"
```

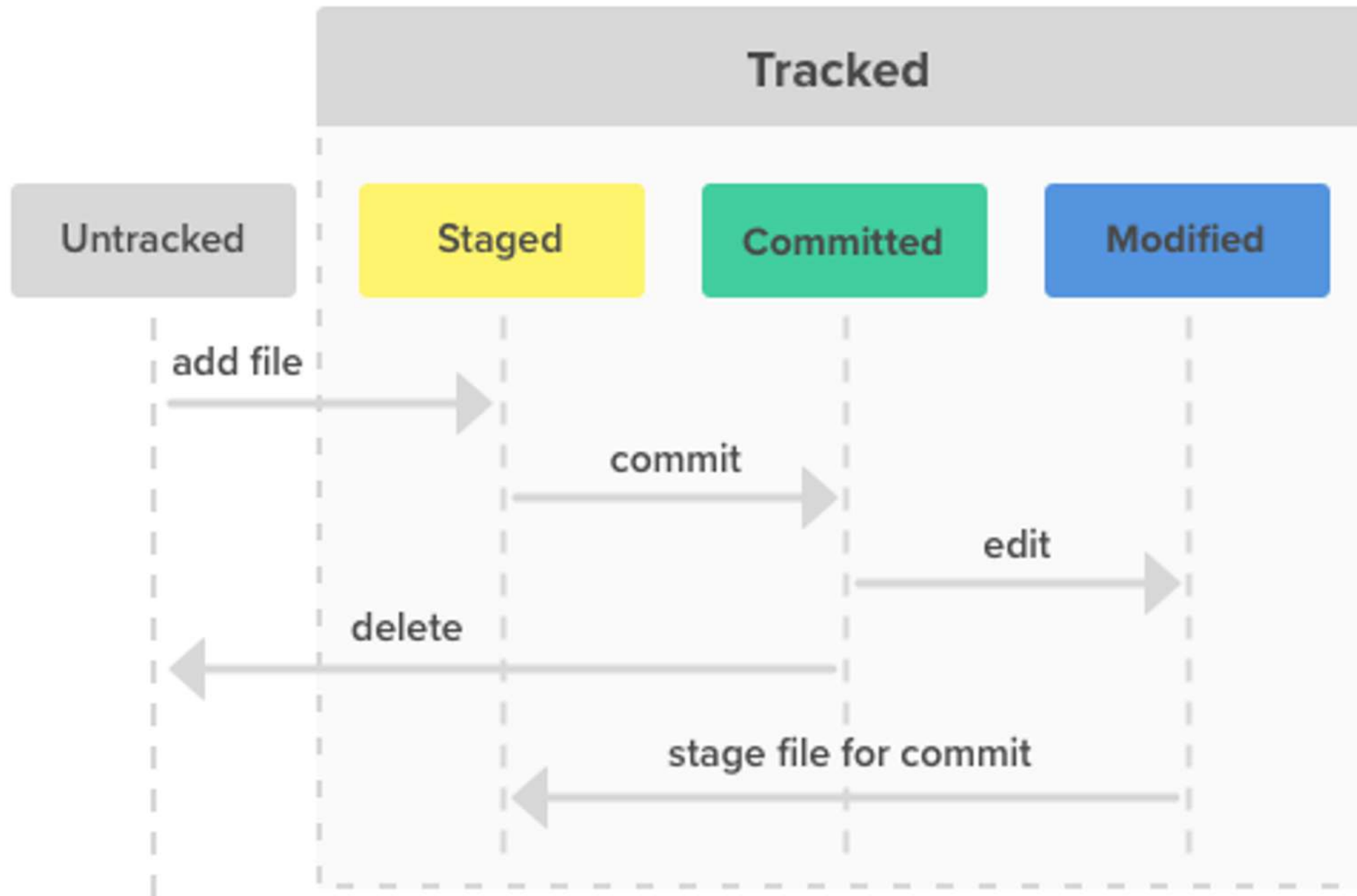
```
git config --global user.email "your@email.com"
```

* For more information, please refer this [link](#).

Creating a new Repository

- Two ways to create a repository
 - Initializing a Repository in an Existing Directory
`git init`
 - Cloning an Existing Repository
 - We will talk about it later
- The repository information will be stored in the `.git` directory

Committing A Version



Committing A Version

- Staging (adding) a file
`git add [file name]`

- Staging all files in the current directory
`git add -A`

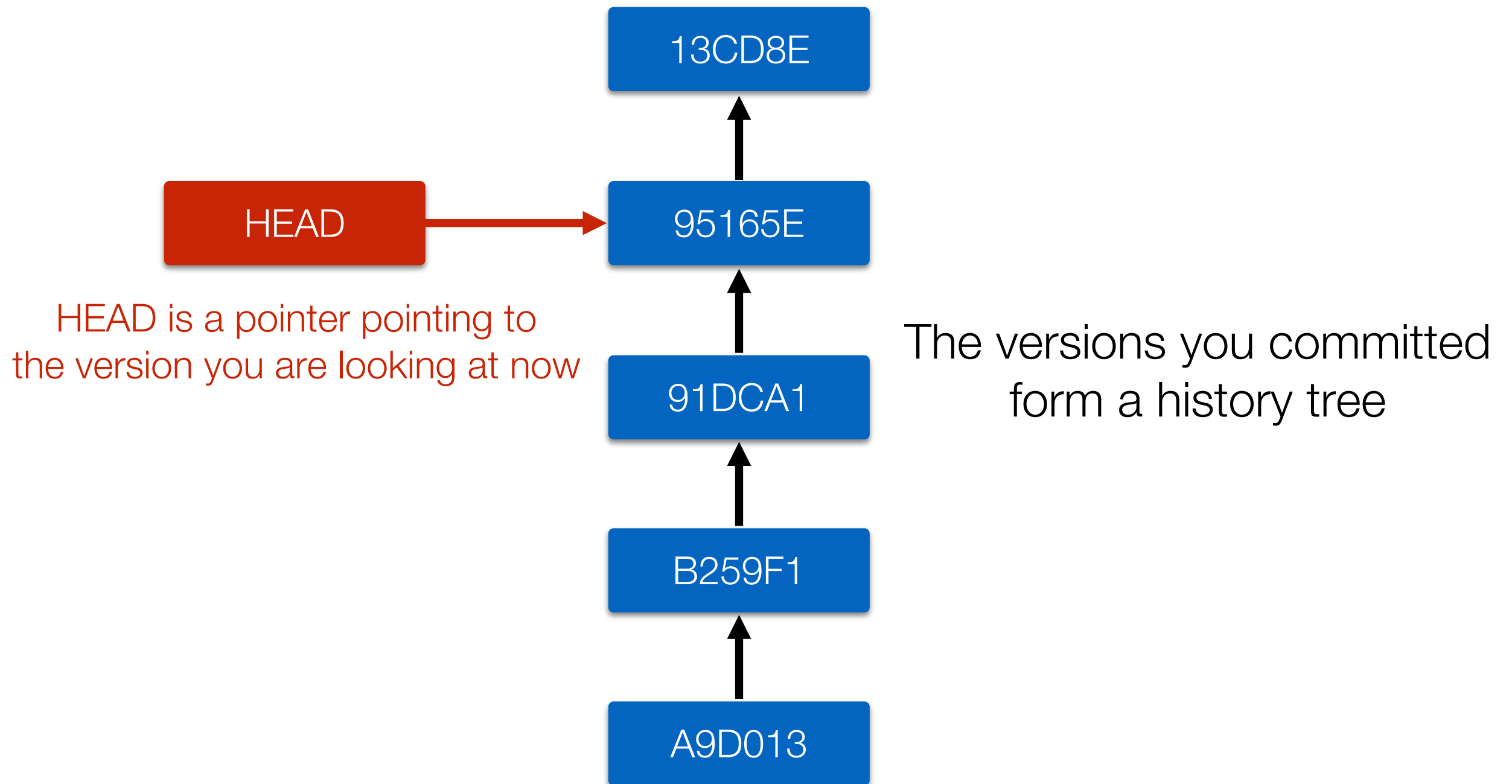
- Committing
`git commit -m "[message]"`

Status

- Checking the current status and the current branch

```
git status
```

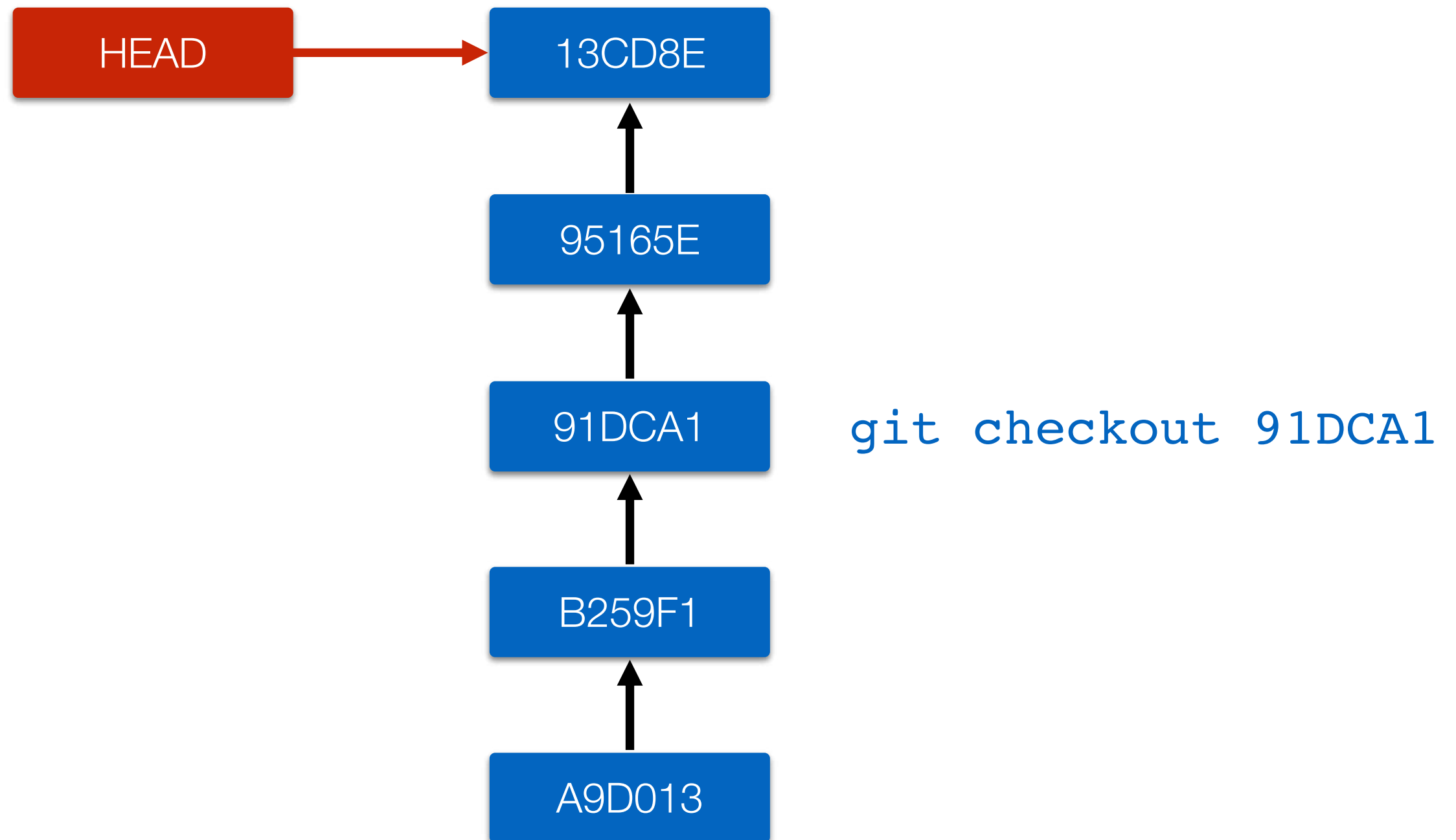

A History Tree



Logs

- Listing the log
`git log`
- Listing each log in one line
`git log --oneline`

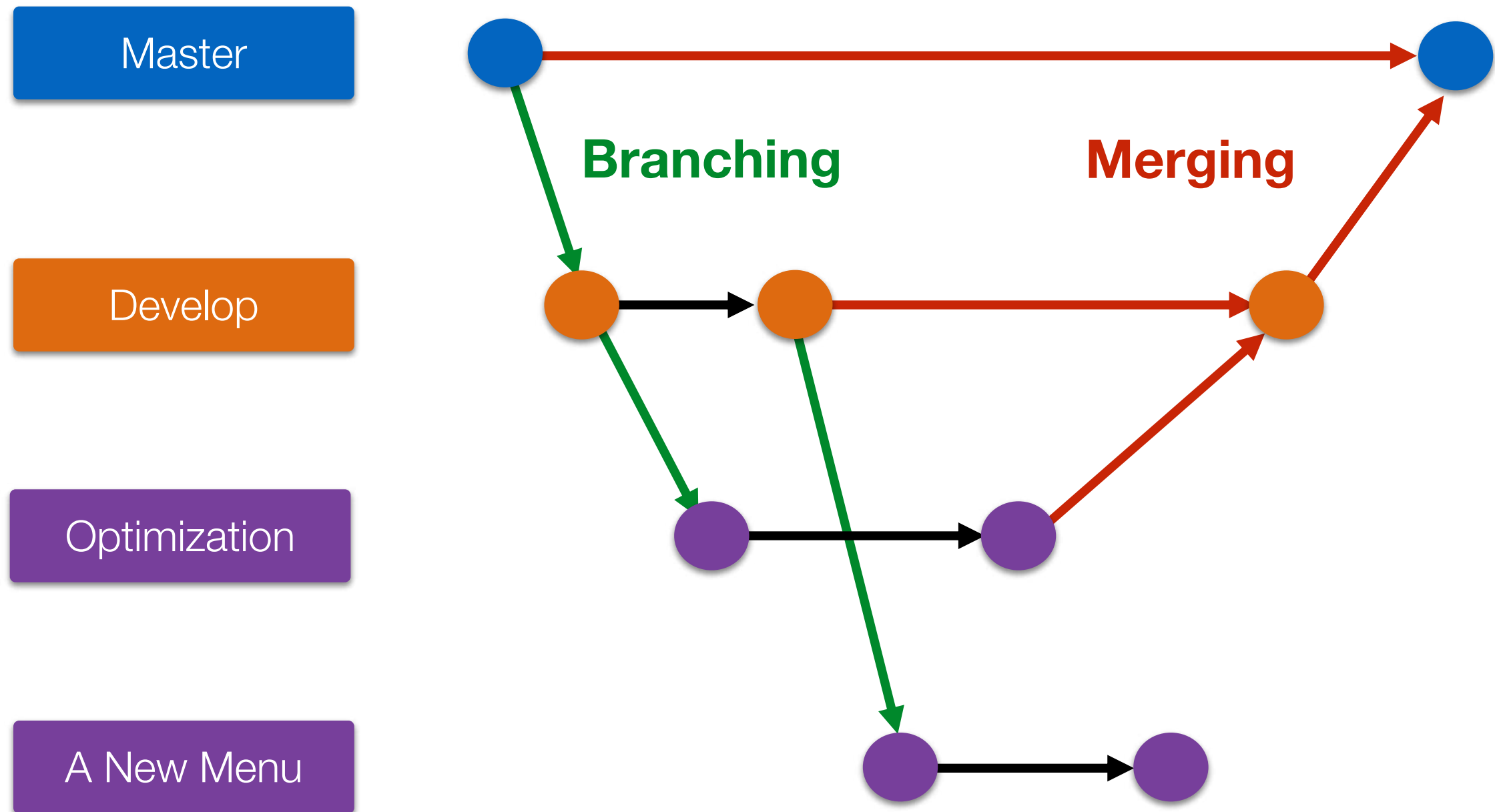
Checking Out A Version



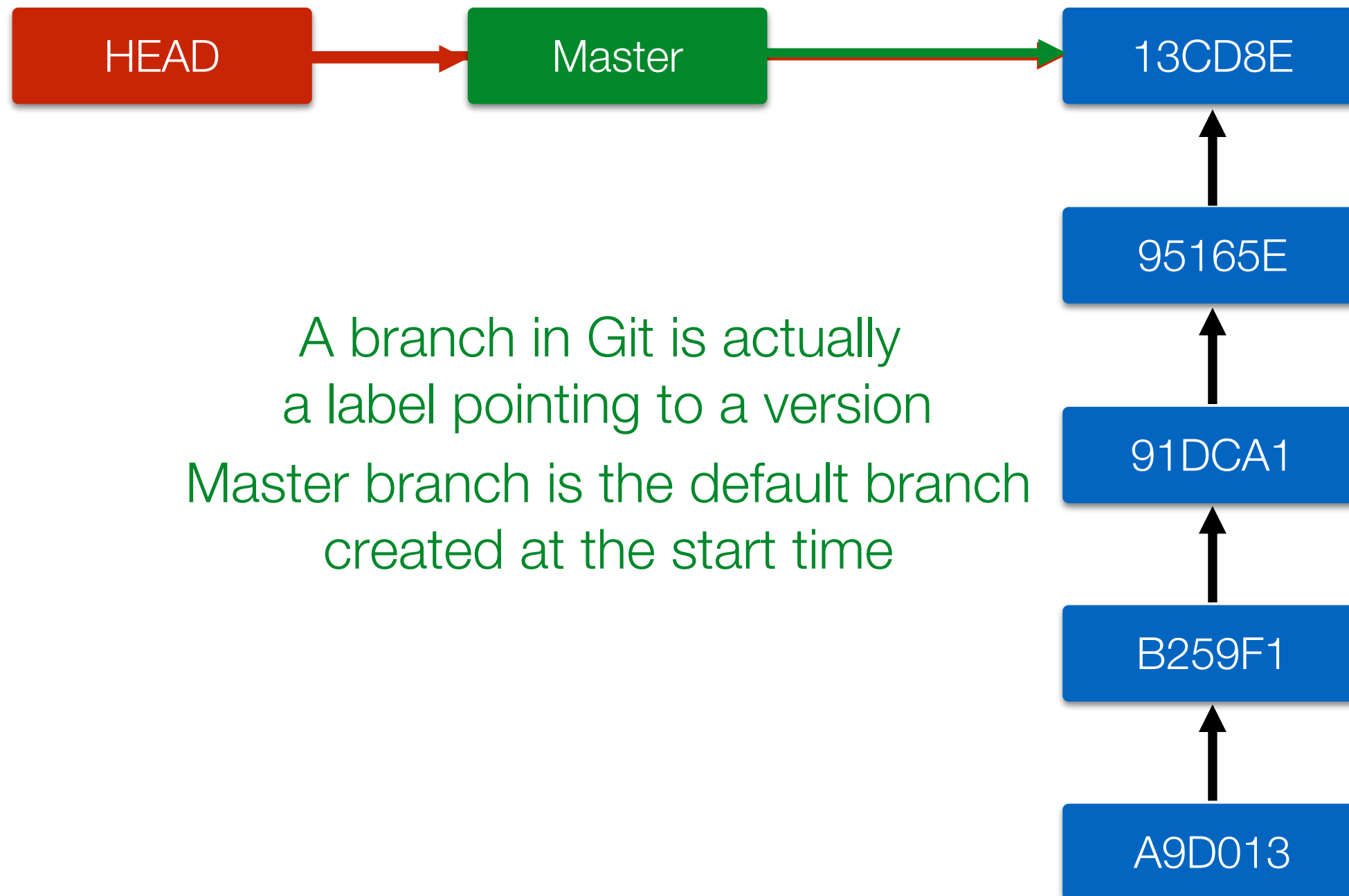
Outline

- Version control system
- Git basics
- **Git branch**
- Remote repository

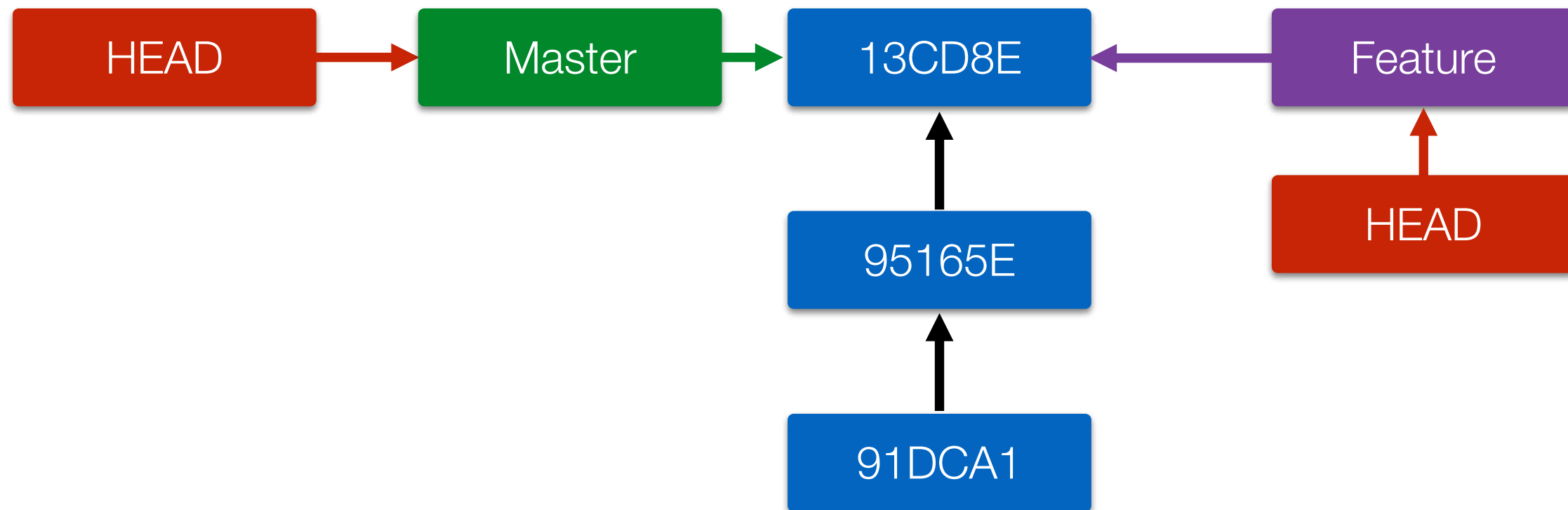
Branches



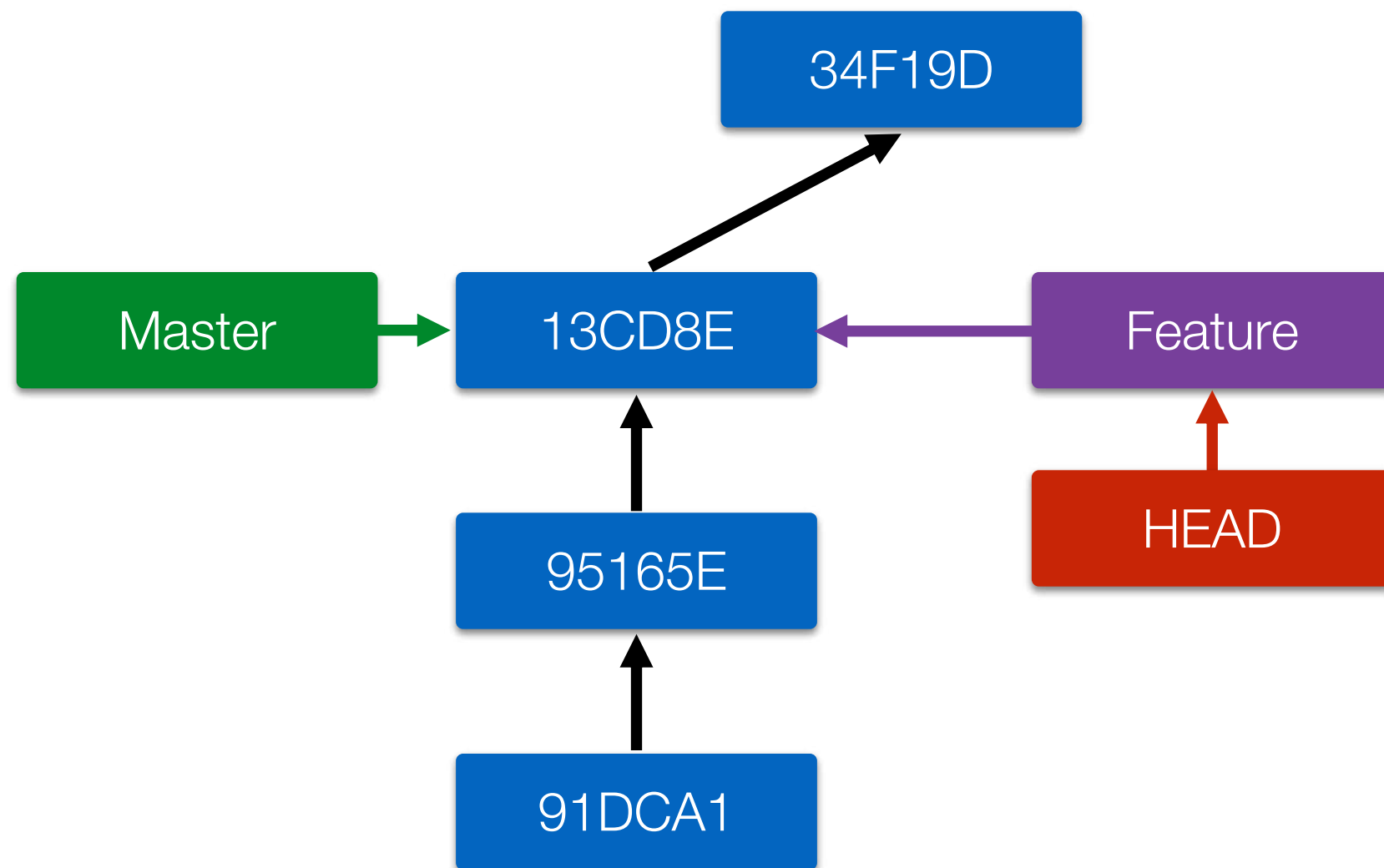
The Master Branch



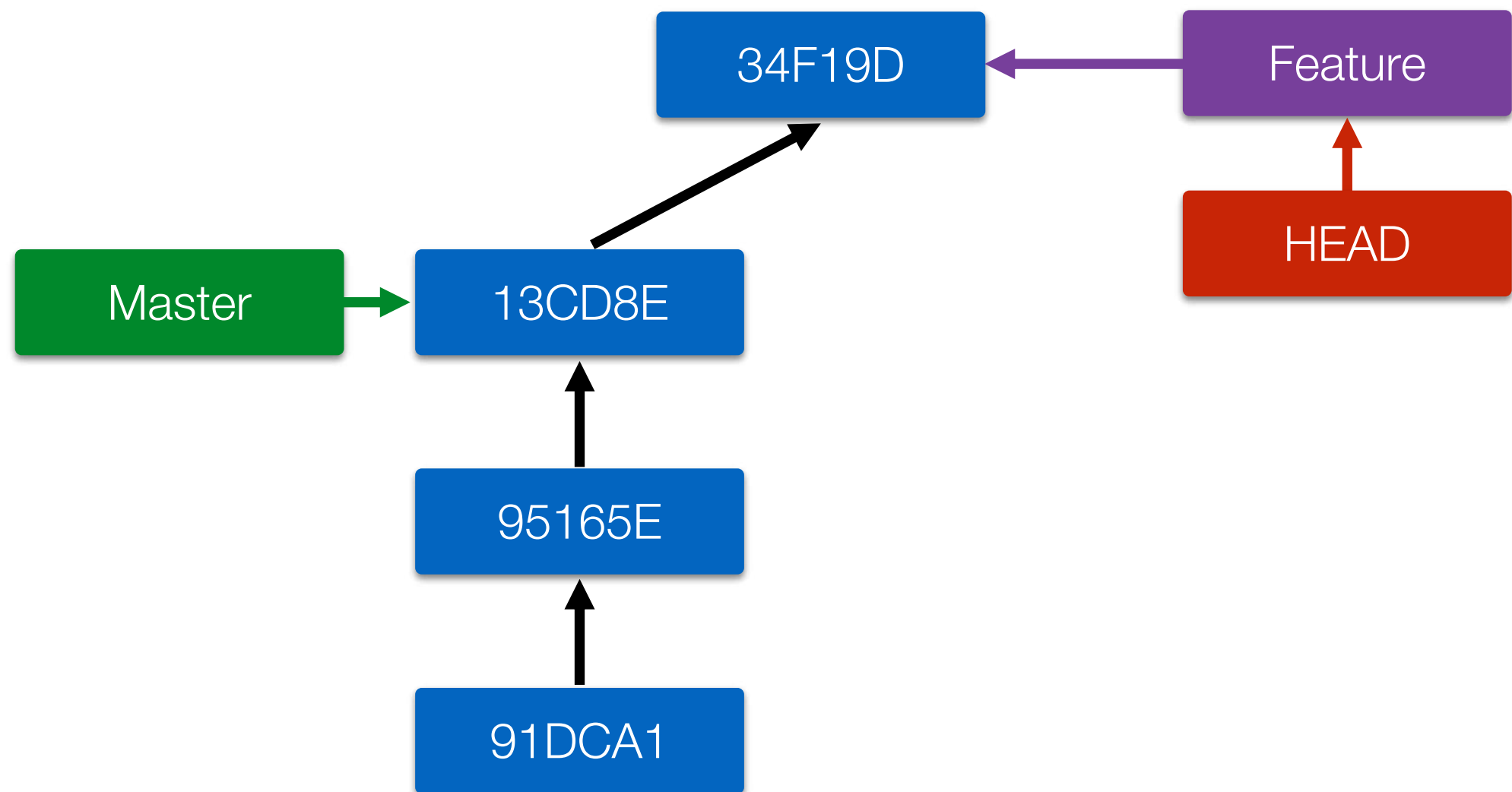
Branching



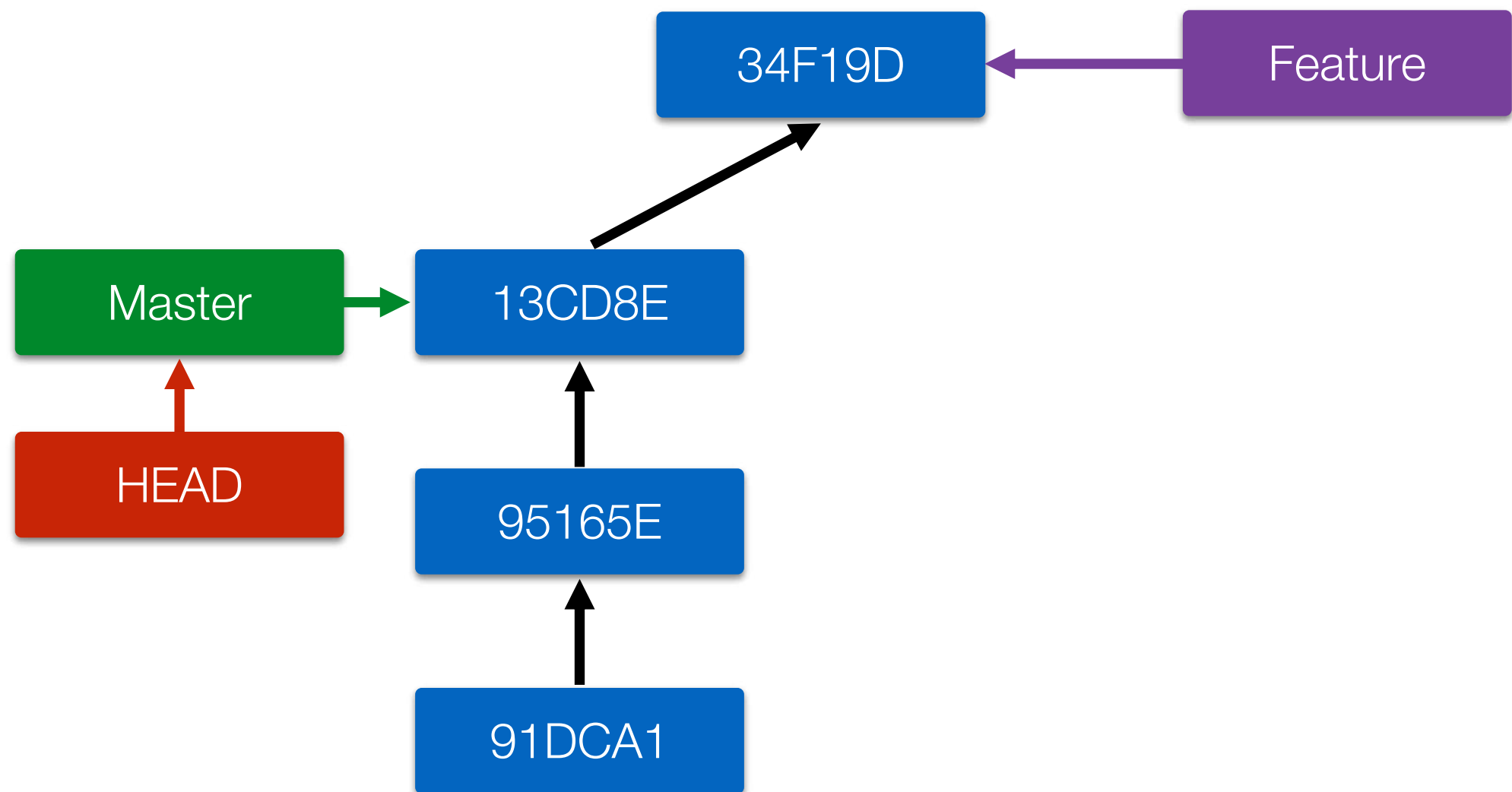
Branching



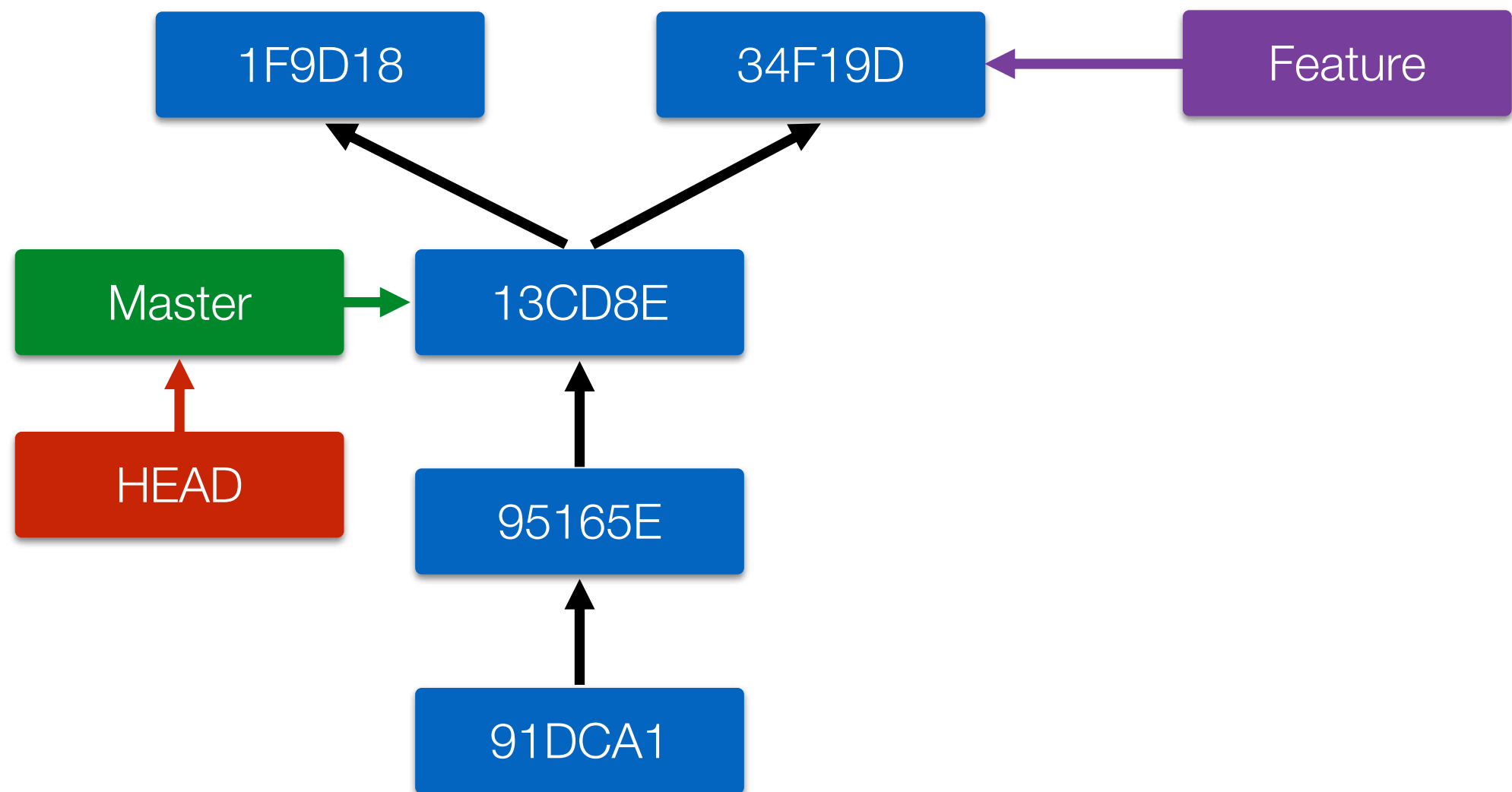
Branching



Branching



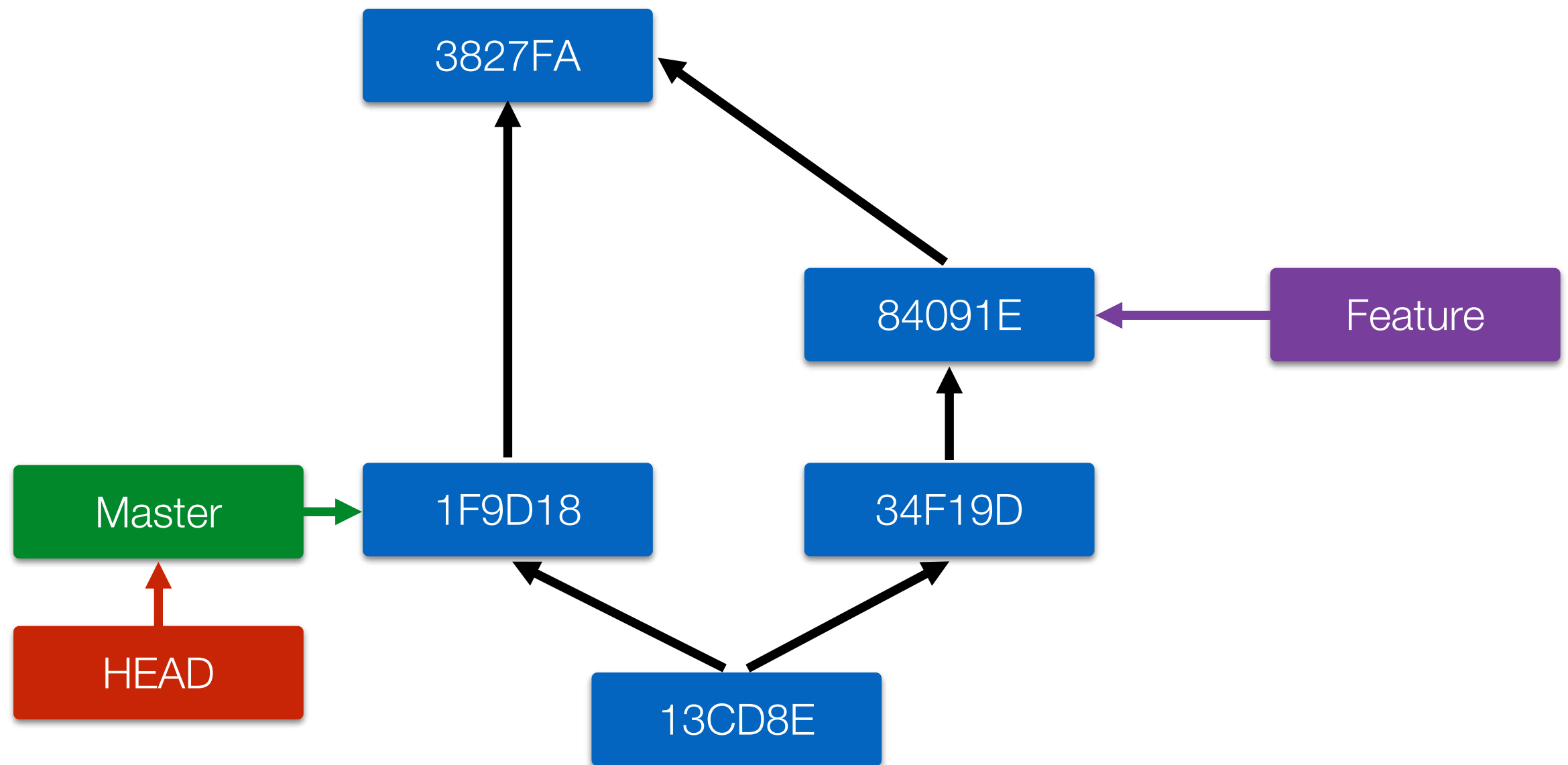
Branching



Git Branching

- Creating a new branch (label)
`git branch [branch name]`
- Checking out the branch (move the HEAD)
`git checkout [branch name]`
- Combining the above commands (create & checkout)
`git checkout -b [branch name]`

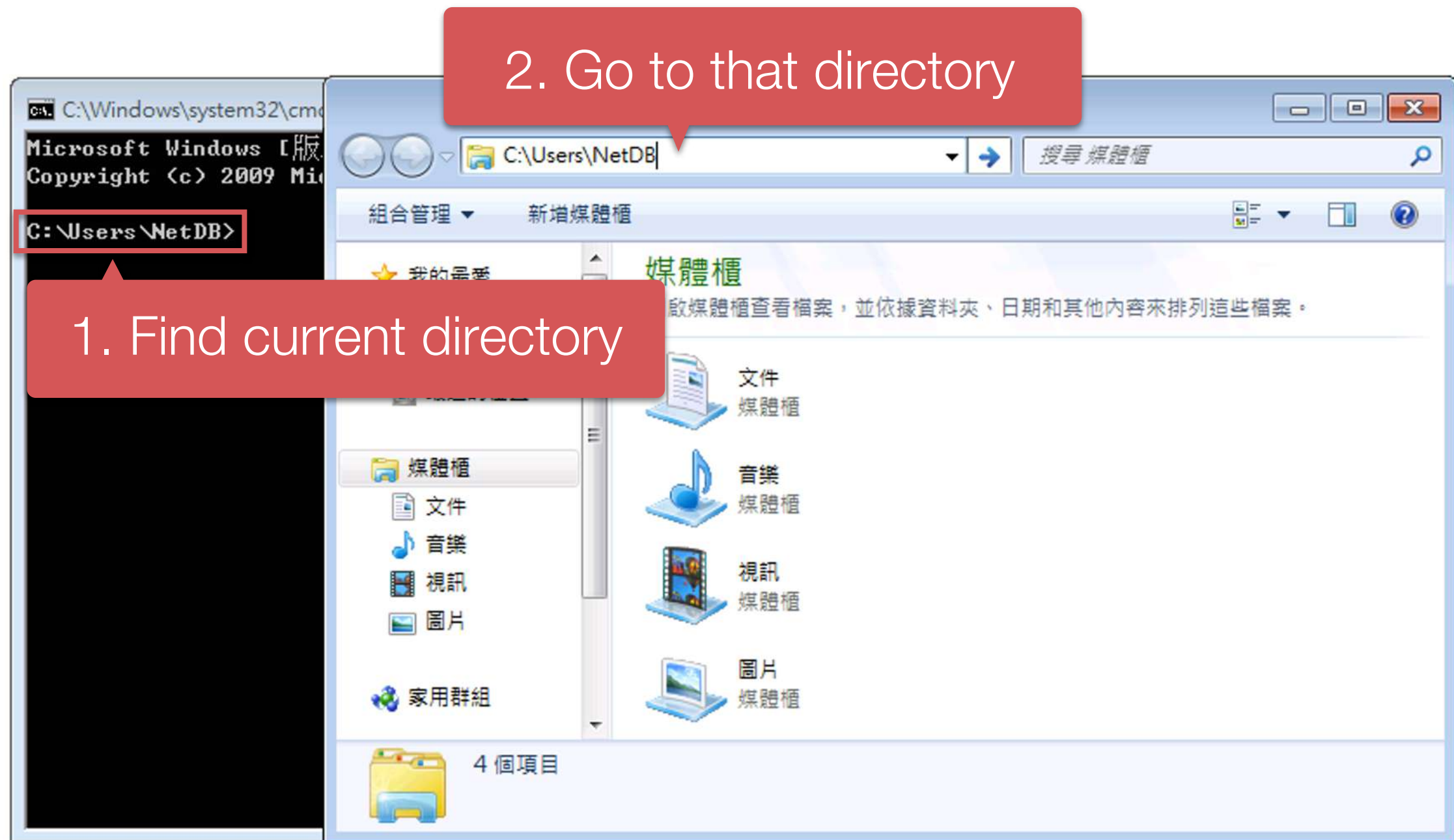
Merging

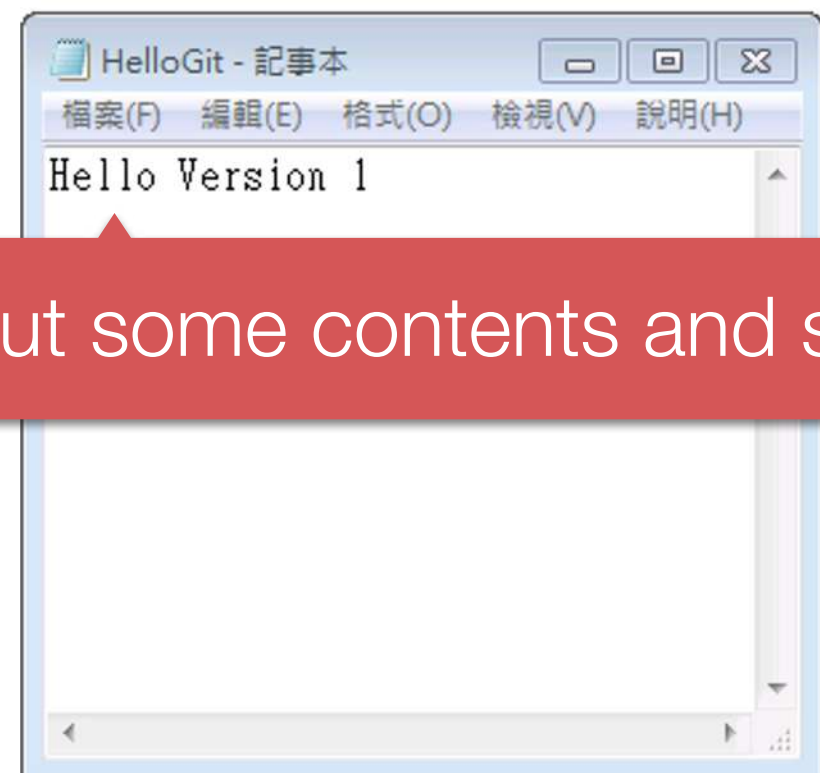
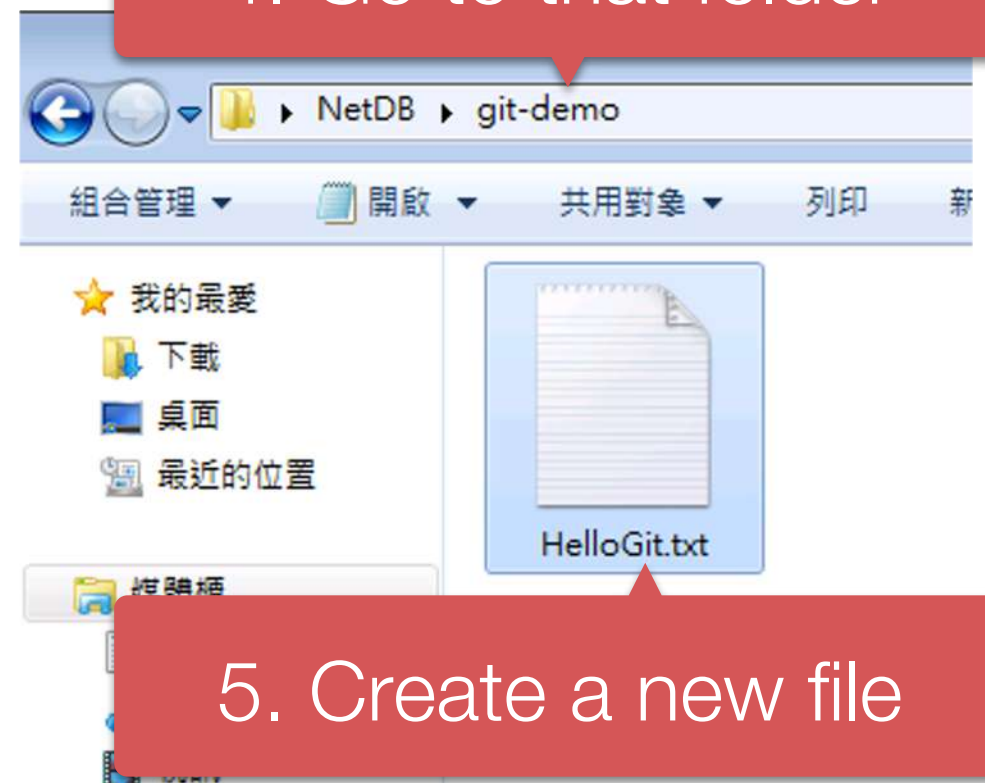
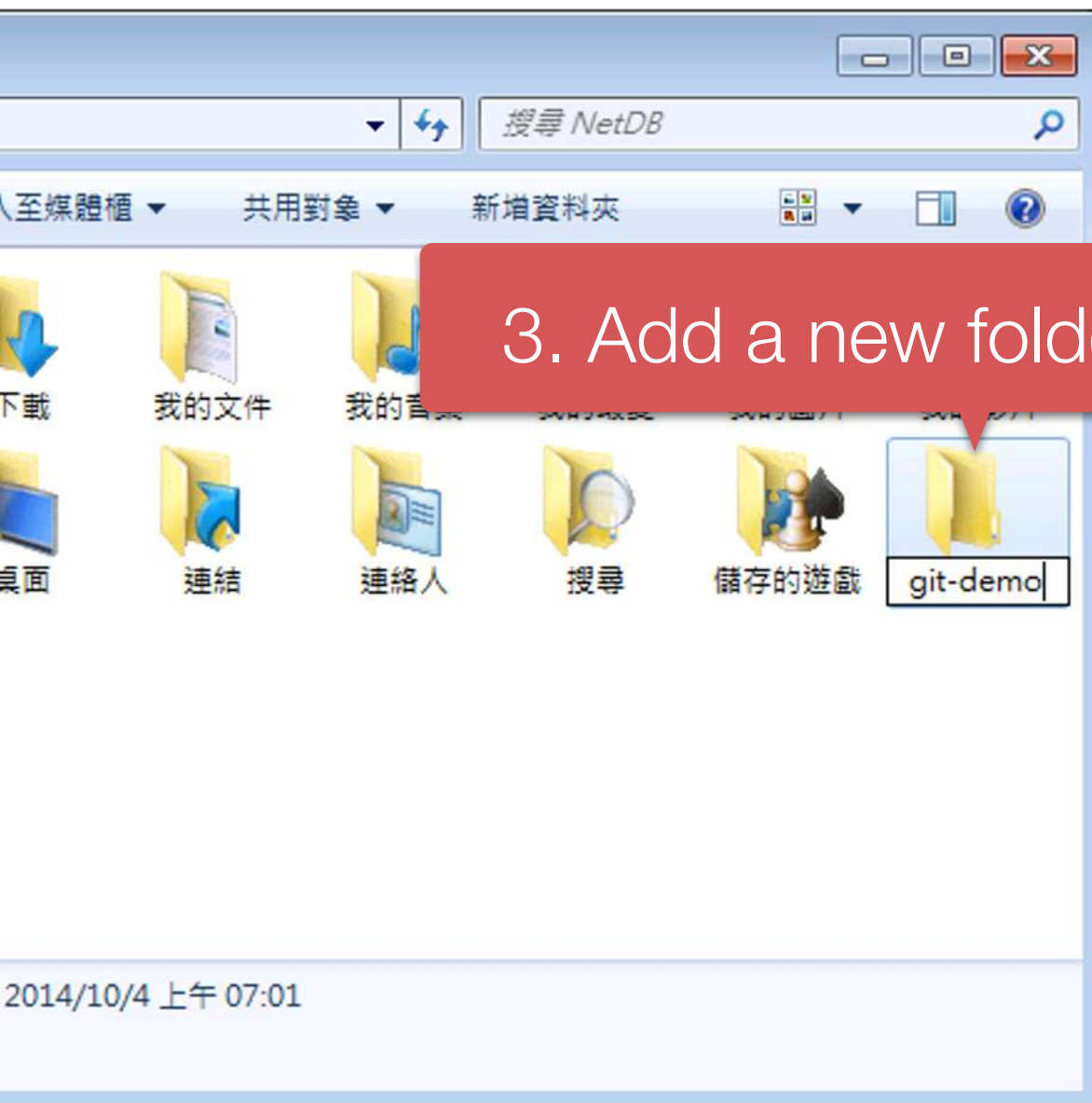


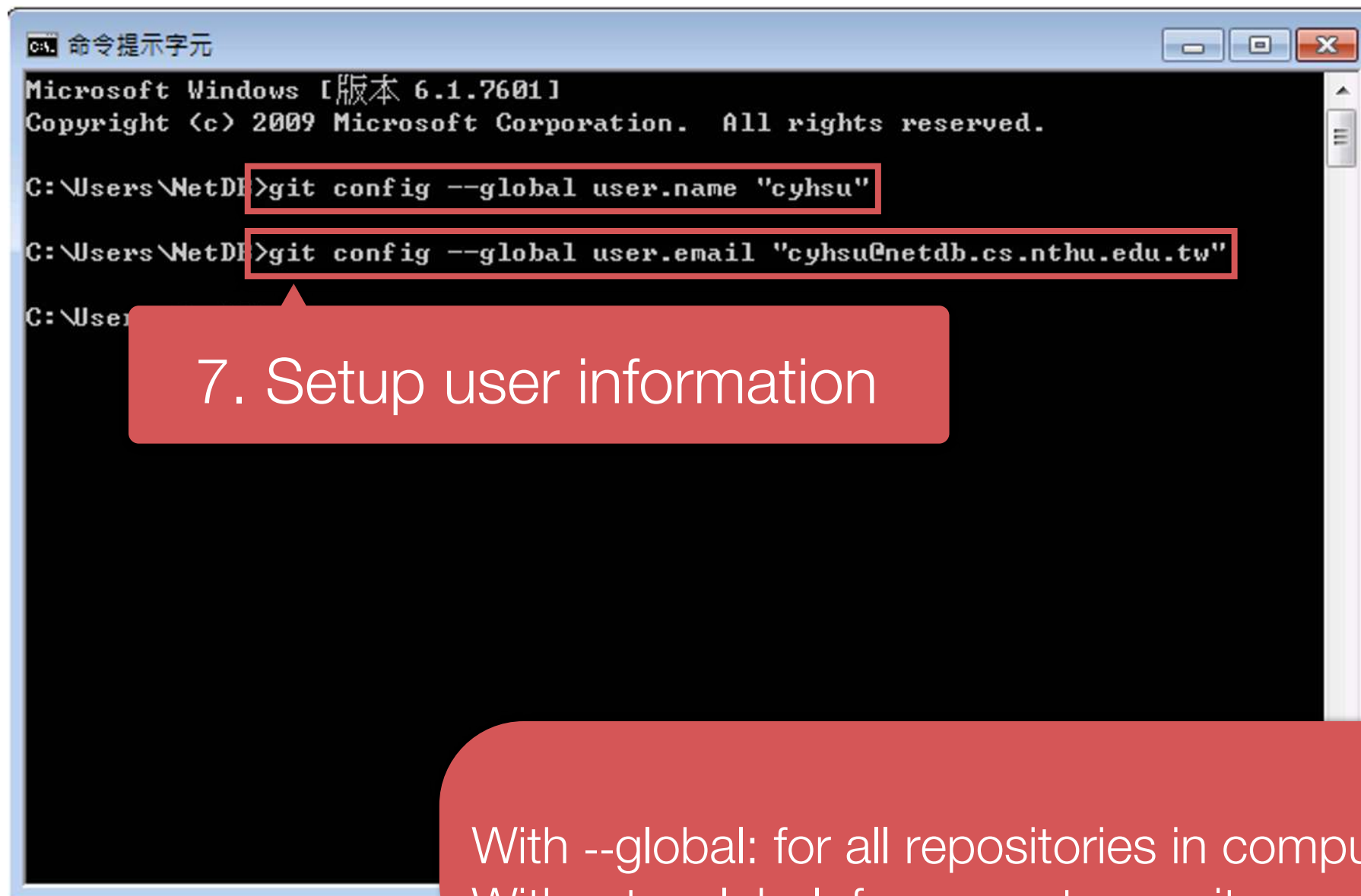
Git Merging

- Merging Steps
 - Checking out a branch to merge
`git checkout [branch 1 name]`
 - Merging another branch
`git merge [branch 2 name]`

Try Git!







A screenshot of a Windows command prompt window titled "命令提示字元". The window shows the following text:

```
Microsoft Windows [版本 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\NetDB>git config --global user.name "cyhsu"
C:\Users\NetDB>git config --global user.email "cyhsu@netdb.cs.nthu.edu.tw"
C:\User
```

Red boxes highlight the two Git configuration commands. A red callout bubble points to the second command.

7. Setup user information

With --global: for all repositories in computer
Without --global: for current repository

```
$ git config --global user.name "name"
$ git config --global user.email "email"
```

```
C:\> 命令提示字元
Microsoft Windows [版本 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users> cd git-demo
C:\Users\NetDB> dir
磁碟區 C 中的磁碟是 WIN7
磁碟區序號: 187B-C5C9

C:\Users\NetDB\git-demo 的目錄
2014/10/04 上午 07:17    <DIR>          .
                ..
                15 HelloGit.txt
                15 位元組
                5,944 位元組可用

C:\Users\NetDB\git-demo> git init
Initialized empty Git repository in C:/Users/NetDB/git-demo/.git/

C:\Users\NetDB\git-demo>
```

```
$ cd git-demo    # go to git-demo directory
$ dir            # list the files
$ git init       # initialize a repository
```

```
命令提示字元
C:\Users\NetDB>cd git-demo

C:\Users\NetDB\git-demo>dir
磁碟區 C 中的磁碟是 WIN7
磁碟區序號: 187B-C5C9

C:\Users\NetDB\git-demo 的目錄
2014/10/04 上午 07:17 <DIR> .
2014/10/04 上午 07:17 <DIR> ..
2014/10/04 上午 07:16      15 HelloGit.txt
                1 個檔案      15 位元組

C:\Users\NetDB\git-demo>git add HelloGit.txt

C:\Users\NetDB\git-demo>git commit -m "version 1"
[master (root-commit) b302d9c] version 1
 1 file changed, 1 insertion(+)
 create mode 100644 HelloGit.txt

C:\Users\NetDB\git-demo>
```

11. Add HelloGit.txt to staging files

12. Commit your changes

Add HelloGit.txt to staging files

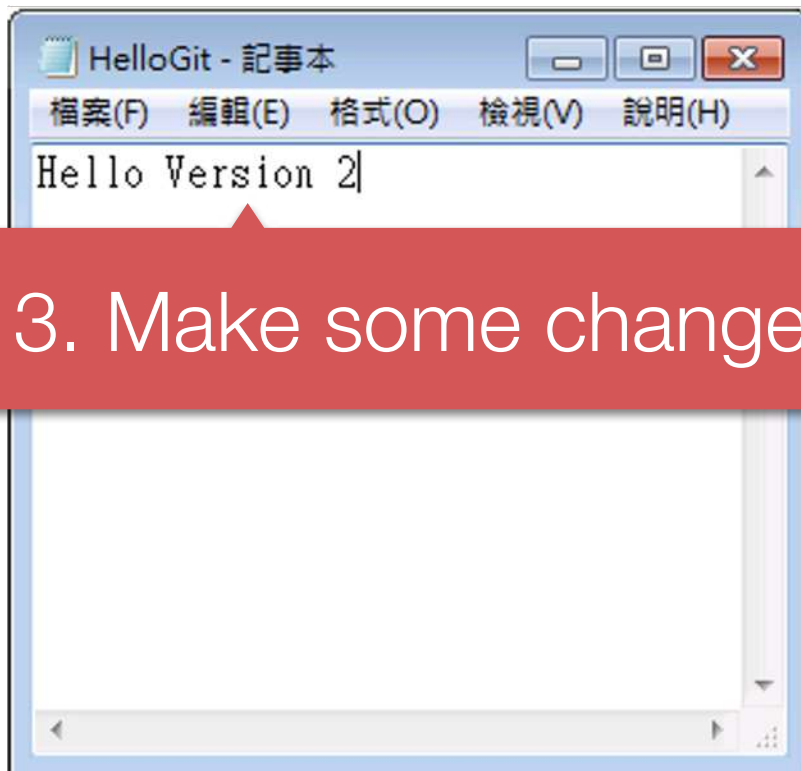
\$ git add HelloGit.txt

Commit the changes to the repository

where "version 1" is the commit message

\$ git commit -m "version 1"

13. Make some changes and save



14. Add it and commit again

```
C:\Users\NetDB\git-demo>git add HelloGit.txt  
C:\Users\NetDB\git-demo>git commit -m "version 2"  
[master e134c84] version 2  
1 file changed, 1 insertion(+), 1 deletion(-)  
  
C:\Users\NetDB\git-demo>
```

15. View your versions

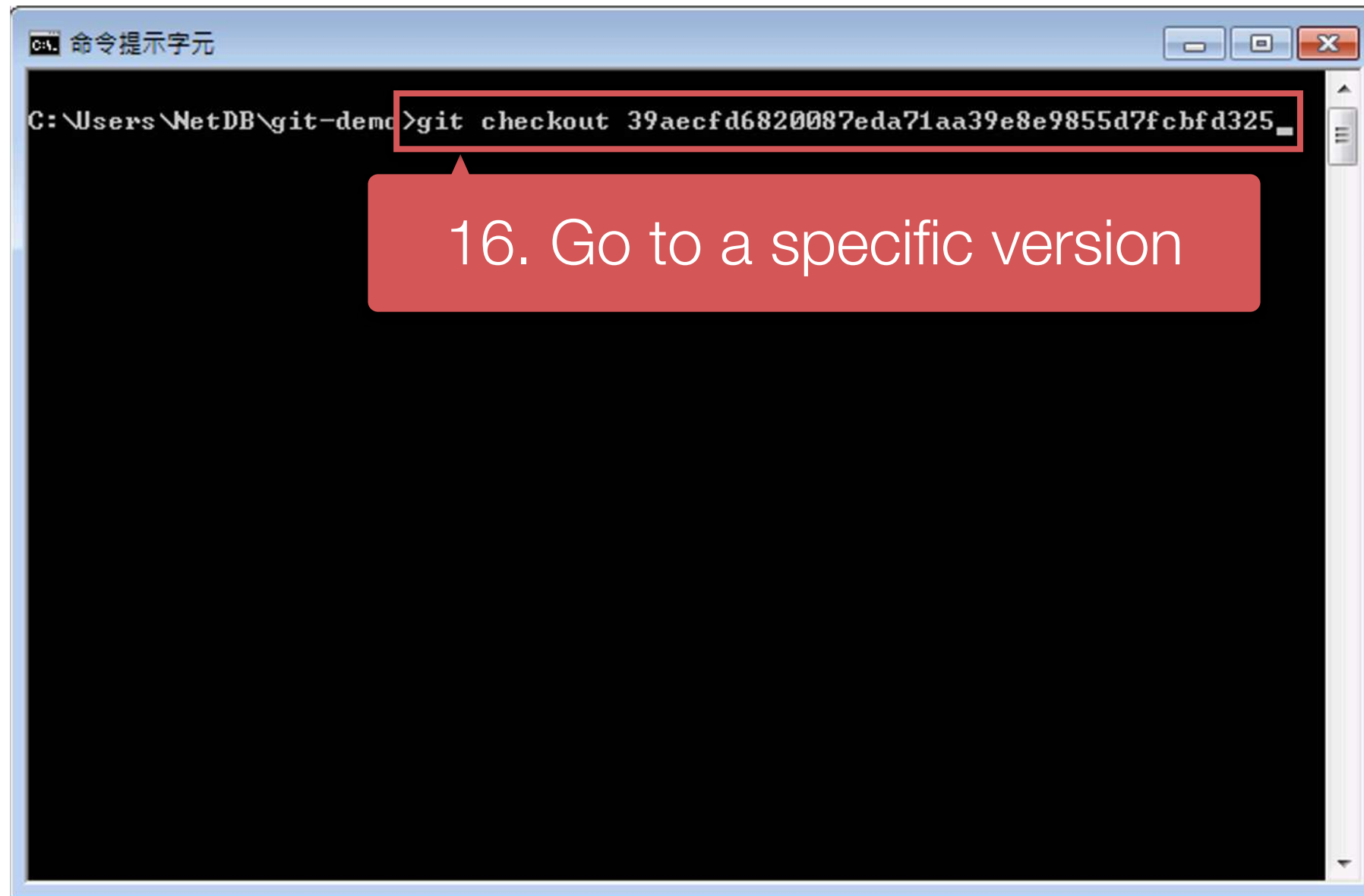
```
C:\Users\NetDB\git-demo>git log
commit e134c845df593f1451c4e9e6c874ddef6df42a76
Author: cyhsu <cyhsu@netdb.cs.nthu.edu.tw>
Date: Sat Oct 4 08:09:55 2014 +0800

    version 2

commit 39aecfd6820087eda71aa39e8e9855d7fcbfd325
Author: cyhsu <cyhsu@netdb.cs.nthu.edu.tw>
Date: Sat Oct 4 08:09:16 2014 +0800

    version 1
```

```
# Show the versions you've created so far
$ git log
```



A screenshot of a Windows command prompt window. The title bar is light blue and contains the text '命令提示字元' (Command Prompt) and standard window controls. The command prompt shows the path 'C:\Users\NetDB\git-demo' followed by the command 'git checkout 39aecfd6820087eda71aa39e8e9855d7fcbfd325'. A red rectangular box highlights the command. A red callout box with a pointer to the command contains the text '16. Go to a specific version'.

```
C:\Users\NetDB\git-demo>git checkout 39aecfd6820087eda71aa39e8e9855d7fcbfd325
```

16. Go to a specific version

```
# Go to a specific version  
$ git checkout {version_id}
```


Version ID

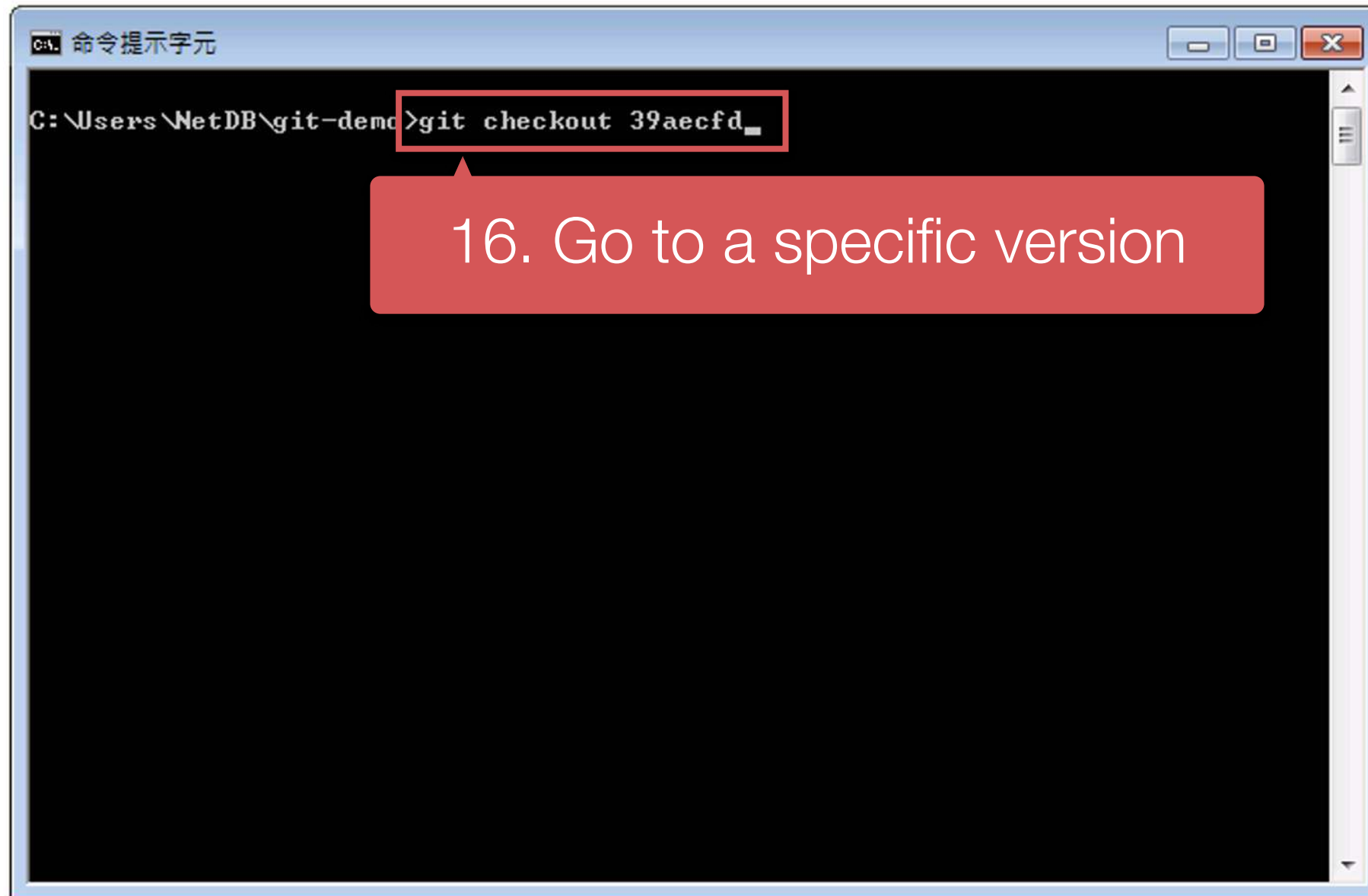
```
C:\Users\NetDB\git-demo>git log --oneline
e134c84 version 2
39aecfd version 1

C:\Users\NetDB\git-demo>
```

15. Show versions with short version ID

56% shorter!

```
# Show versions with short version id
$ git log --oneline
```

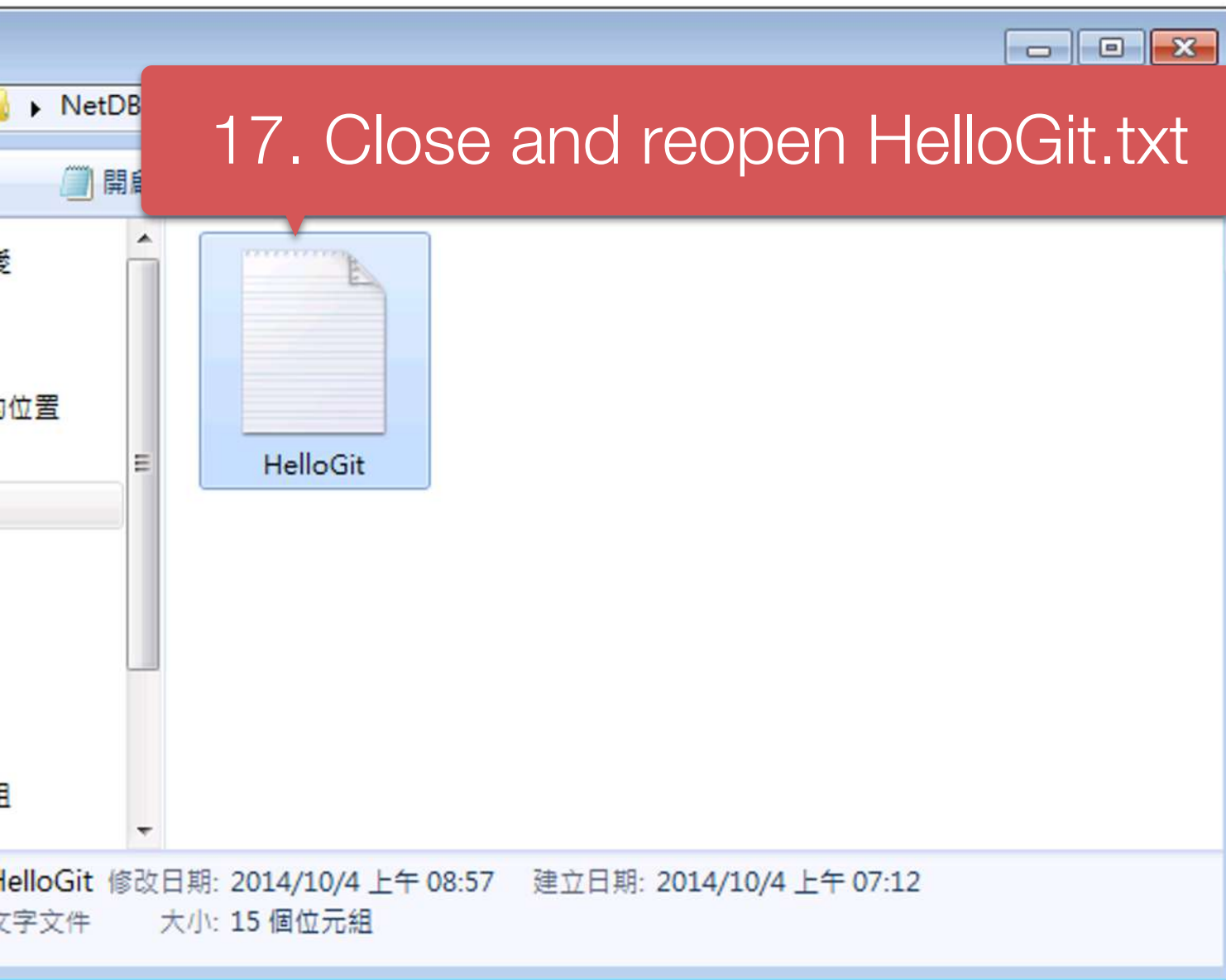
命令提示字元

```
C:\Users\NetDB\git-demo>git checkout 39aecfd_
```

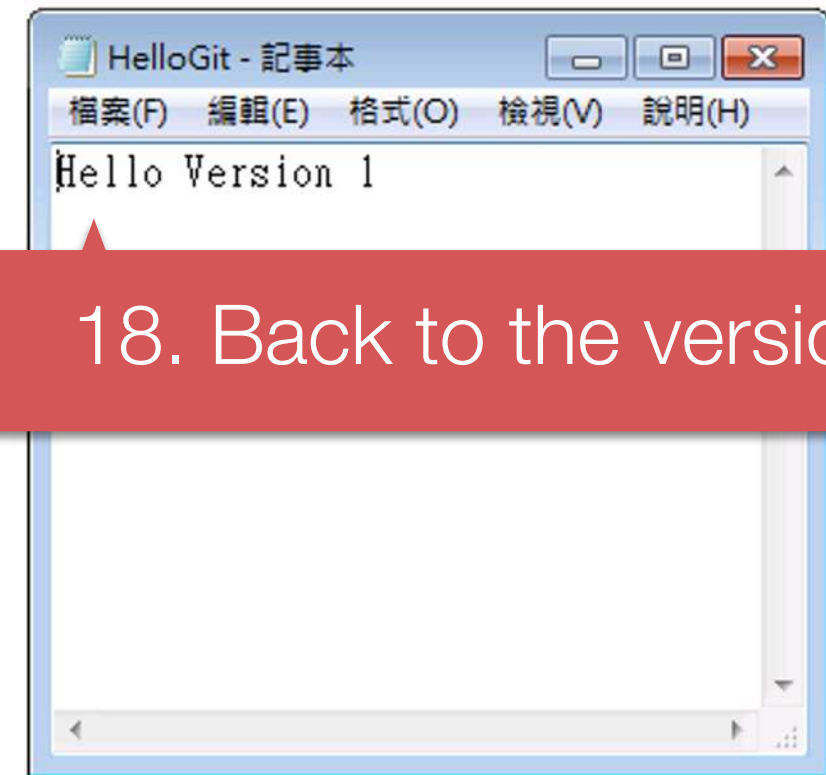
16. Go to a specific version

```
# Go to a specific version.  
# In fact, you only need to type  
# the first 5 characters.  
$ git checkout {short_version_id}
```

17. Close and reopen HelloGit.txt



18. Back to the version 1!



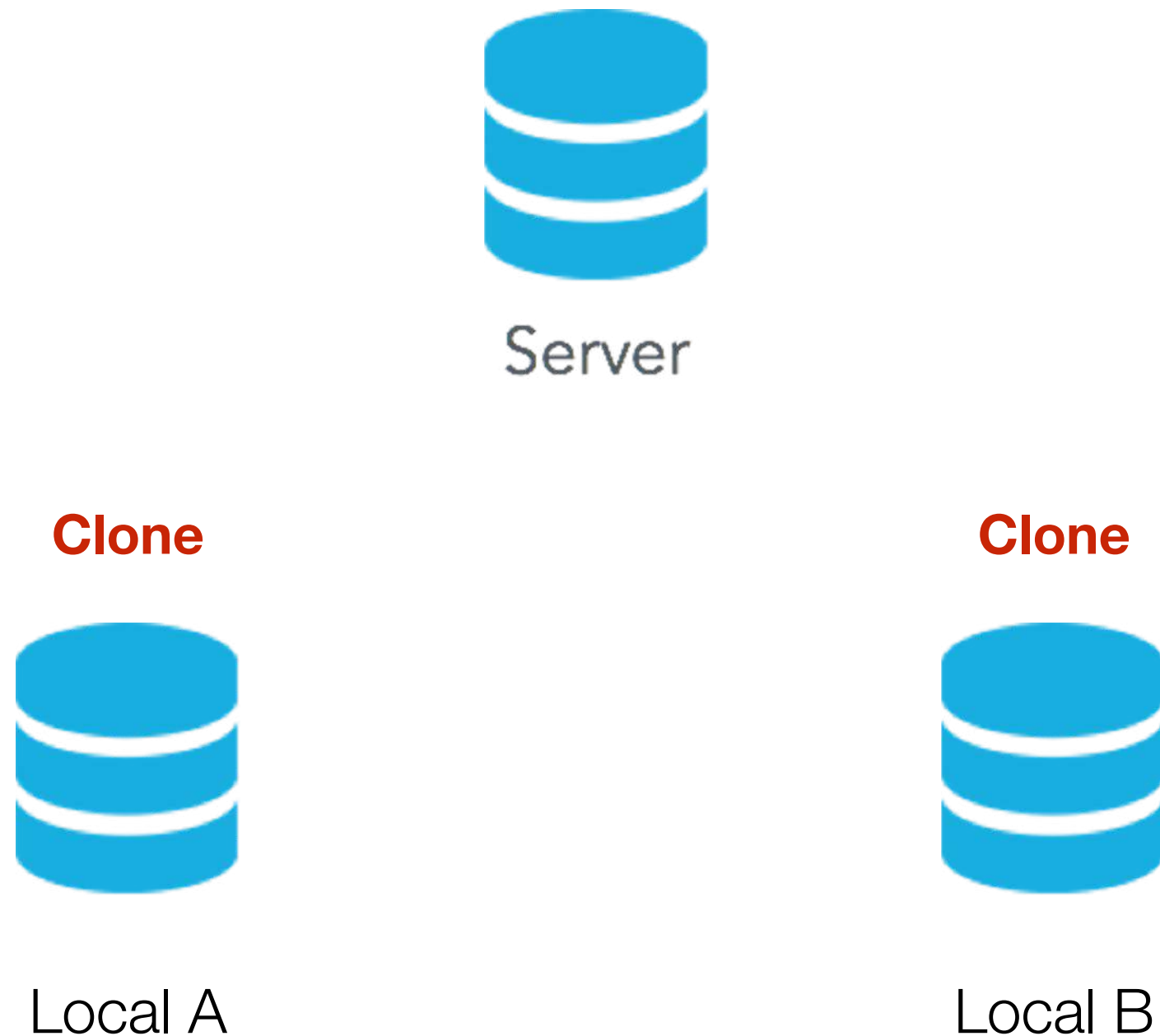
Outline

- Version control system
- Git basics
- Git branch
- **Remote repository**

Collaboration with Git

- To work with others using git, you'll need a server that store the repository.
- Git is distributed, which means
 - Everyone can store a copy of the repository downloaded from the server
 - They can do their jobs independently

Collaboration workflow

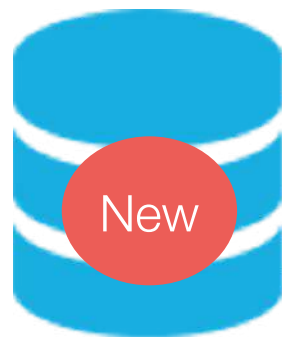


Collaboration workflow



Server

Commit

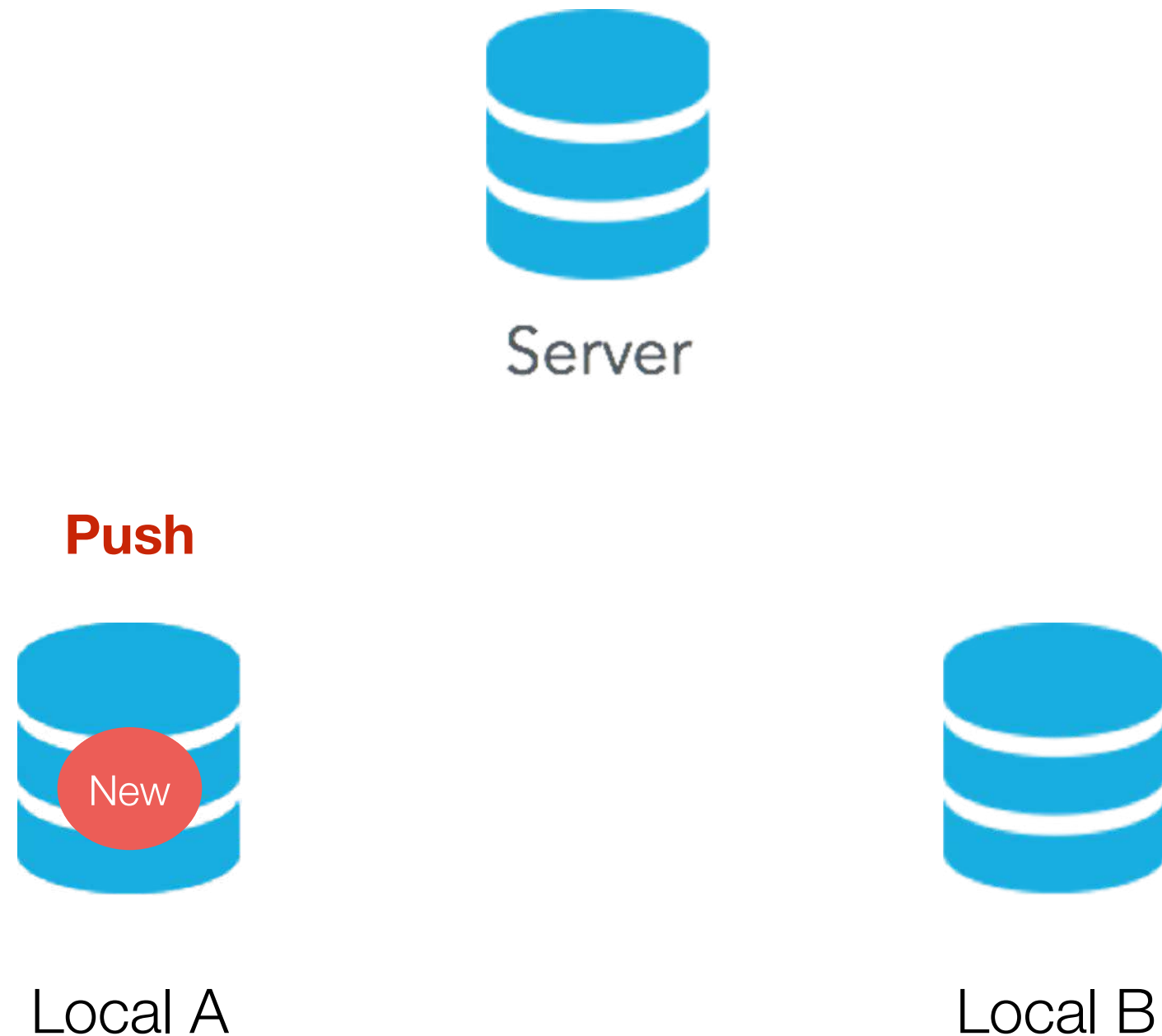


Local A

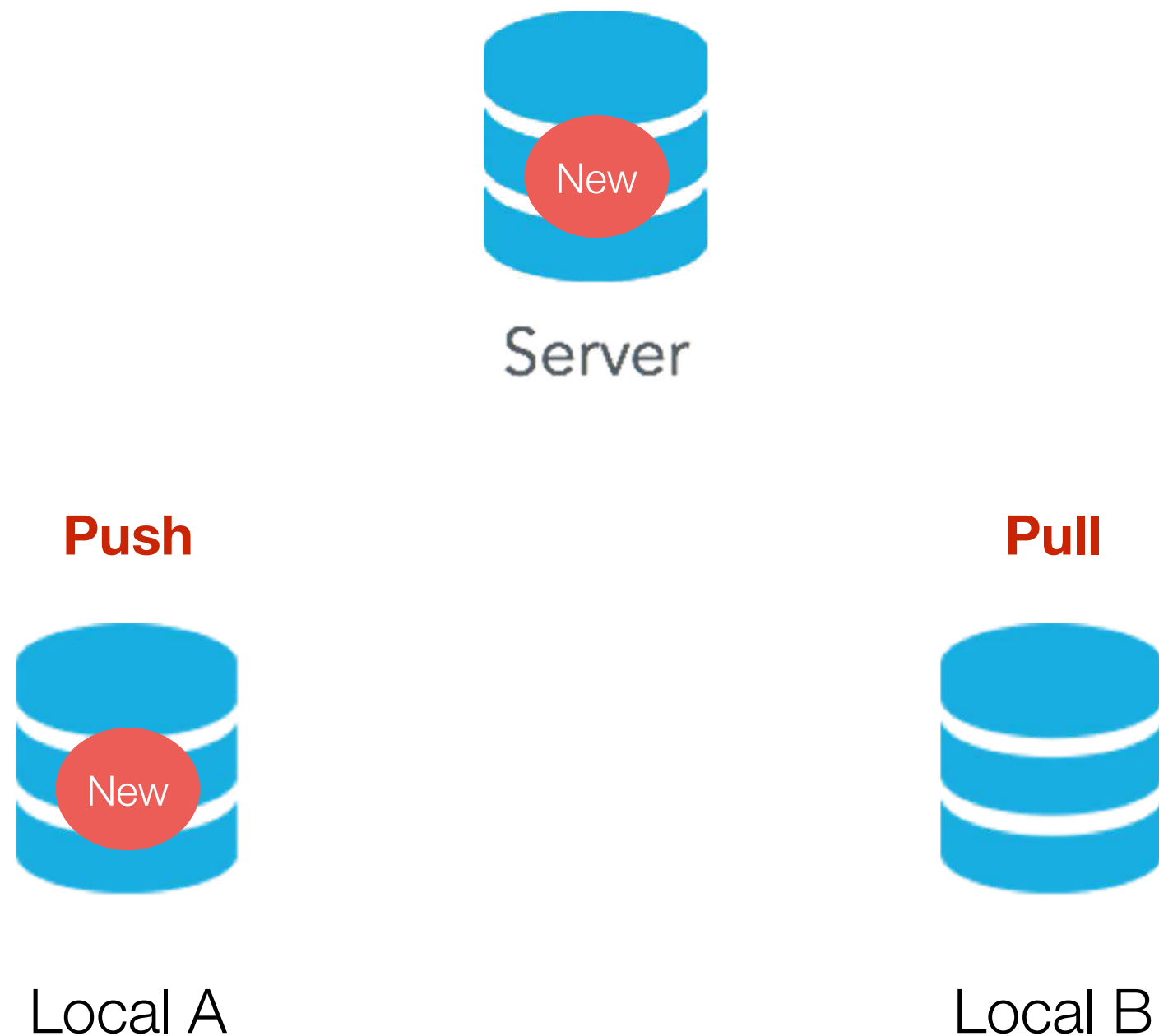


Local B

Collaboration workflow



Collaboration workflow



Cloning & Pushing

- Cloning the remote repositories

```
git clone [Remote URL]
```

- The [Remote URL] is saved as **Origin**

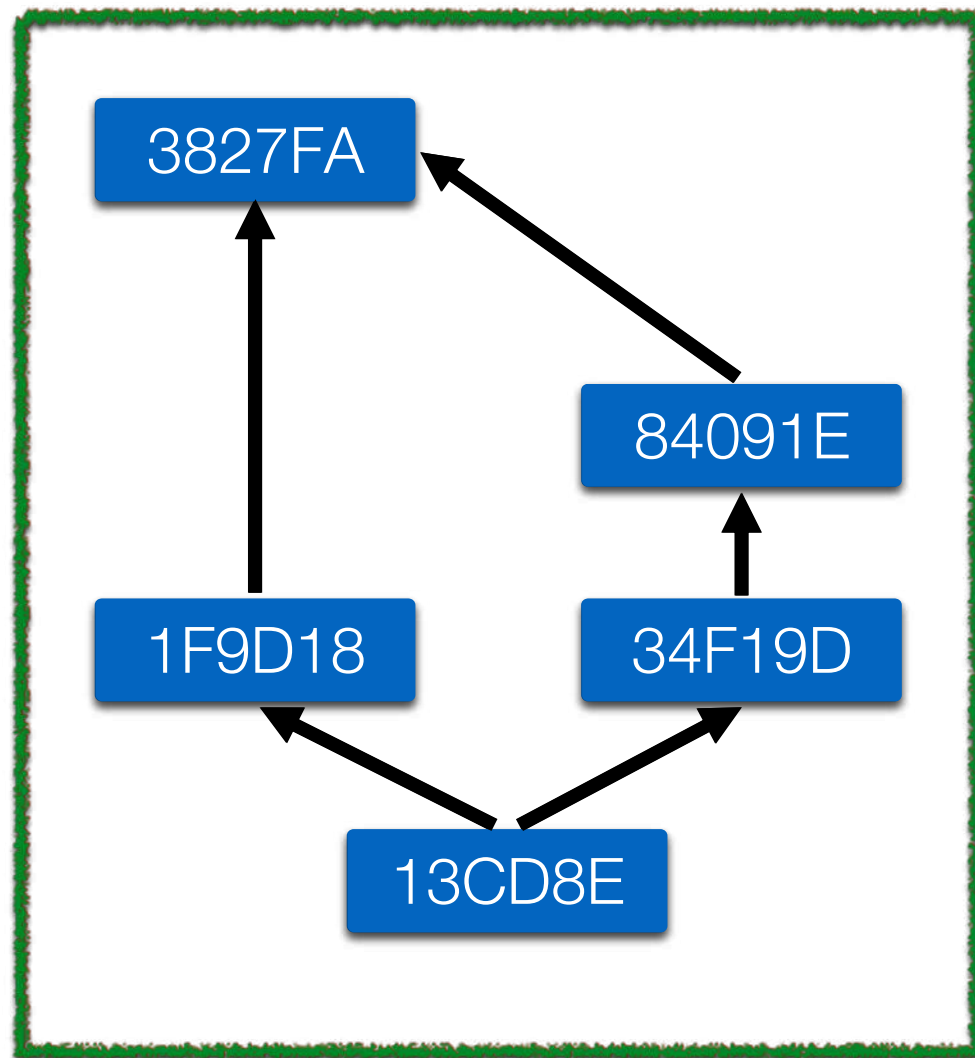
- After committing a few versions, you can push the branch back to **Origin**

```
git push -u origin [Branch Name]
```

Fetch & Pull

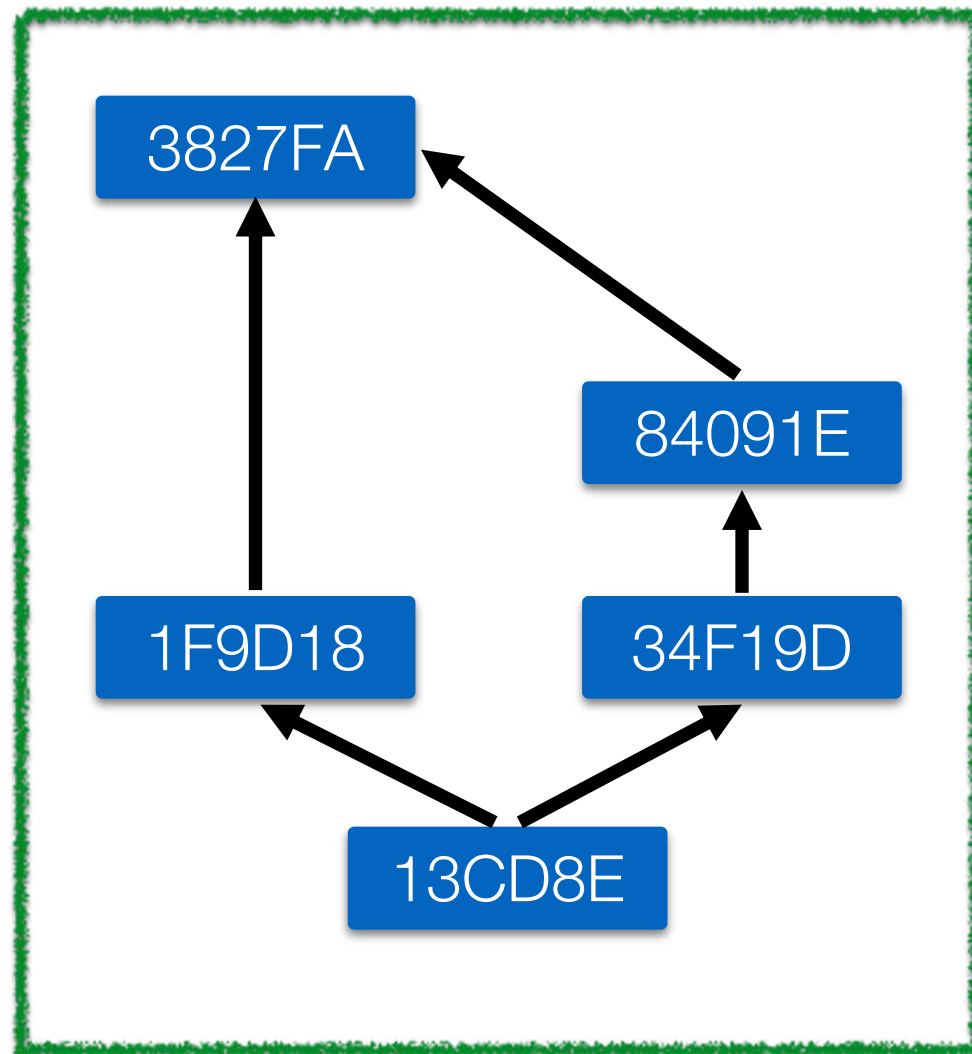
- Updating a branch from the remote repository
 - Fetching the remote repository to local
`git fetch origin`
 - Merging the remote branch
`git merge origin/[Branch Name]`
- Doing above commands in one command
`git pull [Branch Name]`

Fork

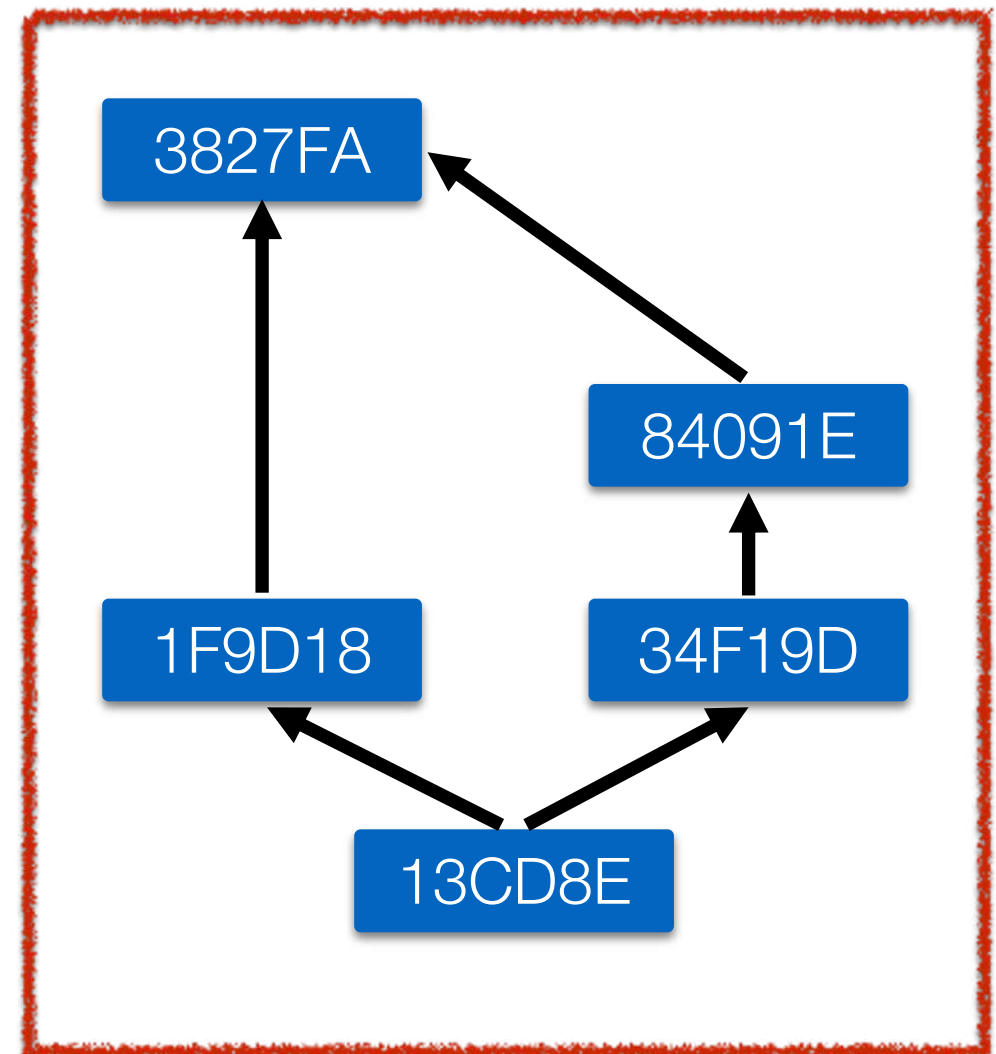


The Repo. Under TA's Account

Fork

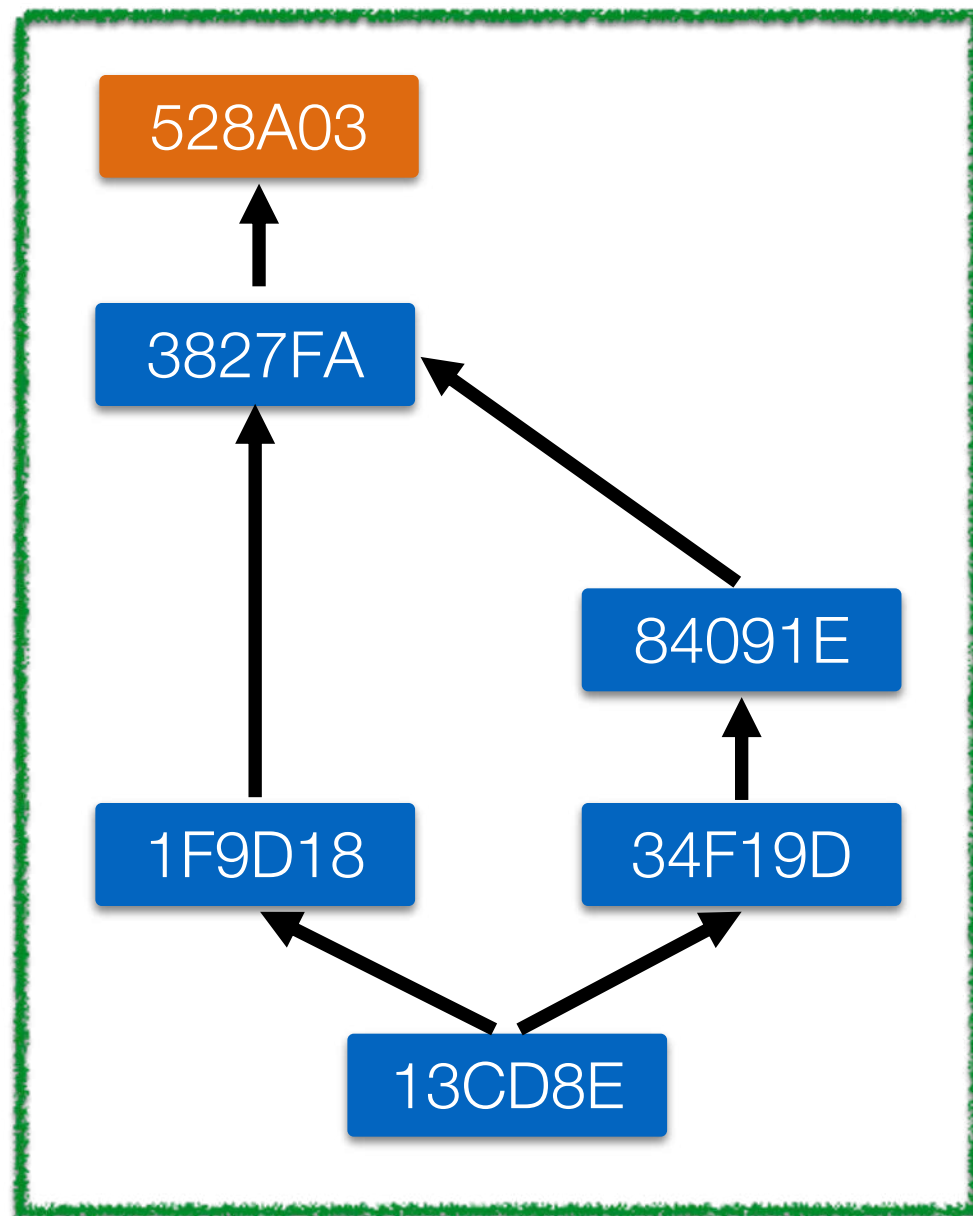


The Repo. Under TA's Account



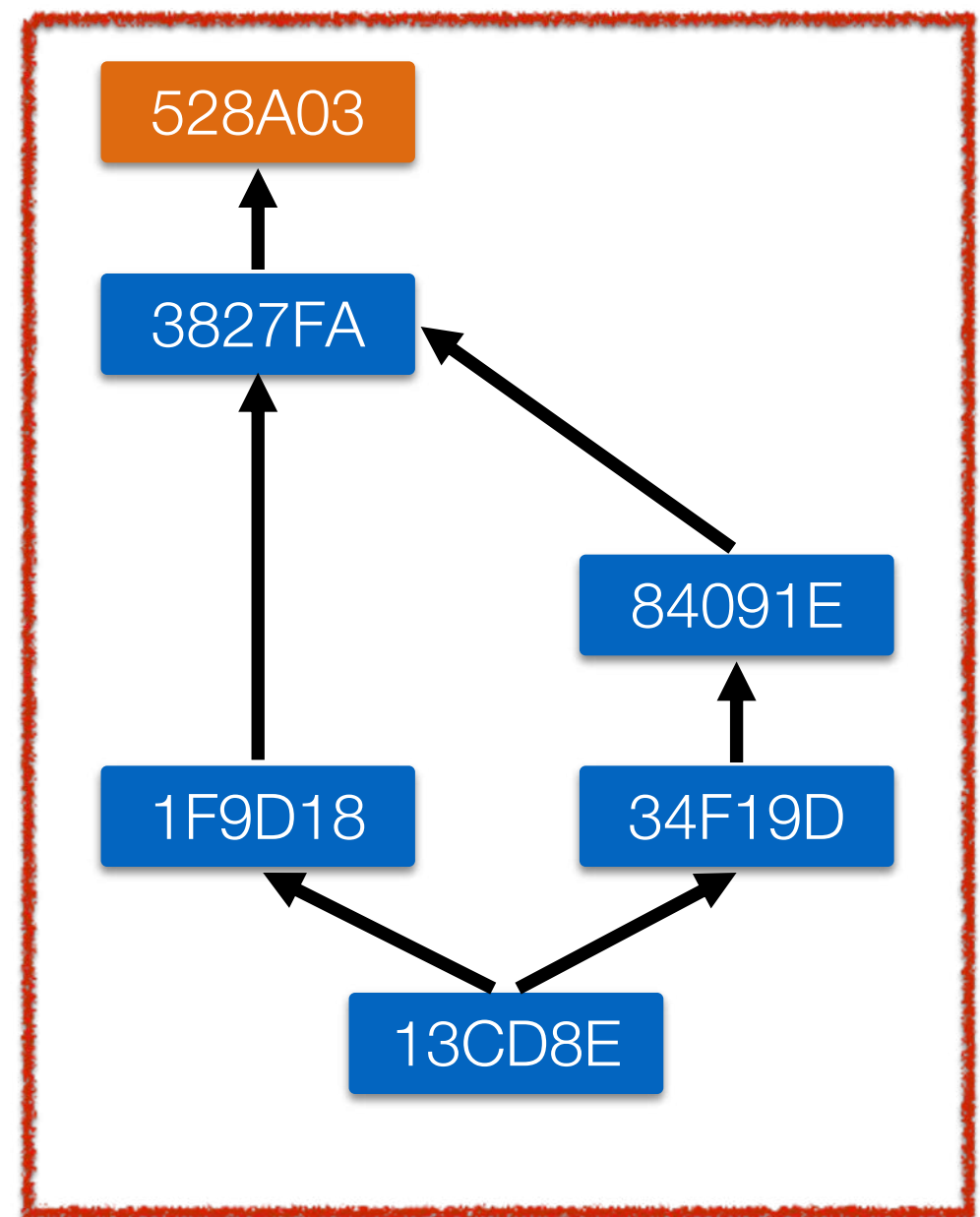
The Repo. Under Your Account

Pull (Merge) Request



Pull
Request

Accept



The Repo. Under TA's Account

The Repo. Under Your Account

.gitignore File

- You can ignore some files that you don't want them to be tracked by editing the .gitignore file
- Remember to track and commit your .gitignore file
- Don't know what should be in .gitignore ?
 - <https://github.com/github/gitignore>
 - <https://www.gitignore.io/>

How to Submit Your Code to Gitlab

Workflow

- For each lab, you should follow the workflow below
 1. Fork our template repository on Gitlab
 2. Clone the forked repository to your computer
 3. Finish your lab
 4. Commit in your computer
 5. Push to Gitlab
 6. Send merge request of **your branch** to our template repository

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Projects ▾

Groups ▾

Activity

Milestones

Snippets

+

Search or jump to...

🔍

📄

🔗

📧

?

🌐

P

practice-submission

🏠 Project

Details

Activity

Releases

Cycle Analytics

📁 Repository

🔖 Issues0

🔗 Merge Requests0

📖 Wiki

✂ Snippets

👤 Members

⏪ Collapse sidebar

🔗 courses

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2020-spring

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practice-submission

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Details

P

practice-submission

Project ID: 9897

🔔 ▾

☆ Star0

🔗 Fork0

📄 Clone ▾

🔒 No license. All rights reserved

🔗 1 Commit

🔗 1 Branch

🔗 0 Tags

📄 41 KB Files

master ▾

practice-submission /

+

▾

History

🔍 Find file

Web IDE

🔗 ▾

🌐

Initial commit

Yi-Chun Chen authored 6 hours ago

9af13851

🔗

📄 README

Auto DevOps enabled


Name	Last commit	Last update
📄 README.md	Initial commit	6 hours ago

📄 README.md

Practice Submission

This repository is built for practicing submissions for assignments and projects. You can follow the instructions below in order to know the whole workflow for submitting an assignment or a project.

Try It !!


 GitLab

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Groups ▾

Activity

Milestones

Snippets 

P practice-submission

Project

Details

Activity

Releases

Cycle Analytics

Repository

Issues 0

Merge Requests 0

Wiki


Snippets

Settings


<< Collapse sidebar

Pin-Yu Wang > practice-submission > Details


P

practice-submission 


Project ID: 9902


 ▾


☆ Star 0


 Fork 0


Clone ▾

 Add license

 0 Commits

 1 Branch

 0 Tags

 0 Bytes Files


Forked from [courses / databases / 2020-spring / practice-submission](#)

master ▾


practice-submission /


+ ▾

History


 Find file


Web IDE


 ▾


 Initial commit


Yi-Chun Chen authored 6 hours ago


9af13851 


 README

 Add CHANGELOG

 Add CONTRIBUTING

 Auto DevOps enabled

Name	Last commit	Last update
 README.md	Initial commit	6 hours ago

 README.md

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1. Click to fork

GitLab

Projects

Groups

Activity

Milestones

Snippets

+

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Q

P

practice-submission

Project

Details

Activity

Releases

Cycle Analytics

Repository

Issues0

Merge Requests0

Wiki

Snippets

Settings

<<

Collapse sidebar

Pin-Yu Wang > practice-submission > Details

2. Check if this repository is under your account

0 Clone

Add license

0 Commits

1 Branch

0 Tags

0 Bytes Files

Forked from [courses / databases / 2020-spring / practice-submission](#)

master

practice-submission / +

History

Find file

Web IDE

Initial commit

Yi-Chun Chen authored 6 hours ago

9af13851

README

Add CHANGELOG

Add CONTRIBUTING

Auto DevOps enabled









Name	Last commit	Last update
README.md	Initial commit	6 hours ago

README.md

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This repository is built for practicing submissions for assignments and projects. You can follow the instructions below in order to know the whole workflow for submitting an assignment or a project.


3. Go to settings


 **GitLab** Projects ▾ Groups ▾ Activity Milestones Snippets  Search or jump to...      


P


practice-submission


 Project


 Repository

 Issues 0

 Merge Requests 0

 Wiki

 Snippets

 **Settings**

General

Members

Integrations

Repository

<< Collapse sidebar

Pin-Yu Wang > practice-submission > General Settings

General project


Update your project name, description, avatar, and other general settings.

Expand

Permissions

Enable or disable certain permissions for this project.

Collapse

Project visibility 

Private

The project is accessible only by members of the project. Access must be granted explicitly to each user.

Issues

Lightweight issue tracking system for this project

Only Project Members

Repository

View and edit files in this project

Only Project Members

Merge requests

Submit changes to be merged upstream

Only Project Members

4. Set project to private

61

Save changes

Expand

Expand

Expand

Expand

Perform advanced options such as housekeeping, archiving, renaming, transferring, or removing your project.

Workflow

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Search or jump to...

P

practice-submission

Project

Details

Activity

Releases

Cycle Analytics

Repository

Issues

Merge Requests

Wiki

Snippets

Settings

Pin-Yu Wang > practice-submission > Details

P

practice-submission

Project ID: 9902

Add license

0 Commits

1 Branch

0 Tags

0 Bytes Files

Forked from [courses / databases / 2020-spring / practice-submission](#)

master

practice-submission /

+

Initial commit

Yi-Chun Chen authored 6 hours ago

9af13851

README

Add CHANGELOG

Add CONTRIBUTING

Auto DevOps enabled

Name	Last commit	Last update
README.md	Initial commit	6 hours ago

README.md

Practice Submission

This repository is built for practicing submissions for assignments and projects. You can follow the instructions below in order to know the whole

2. Copy the link

1. Choose HTTPS


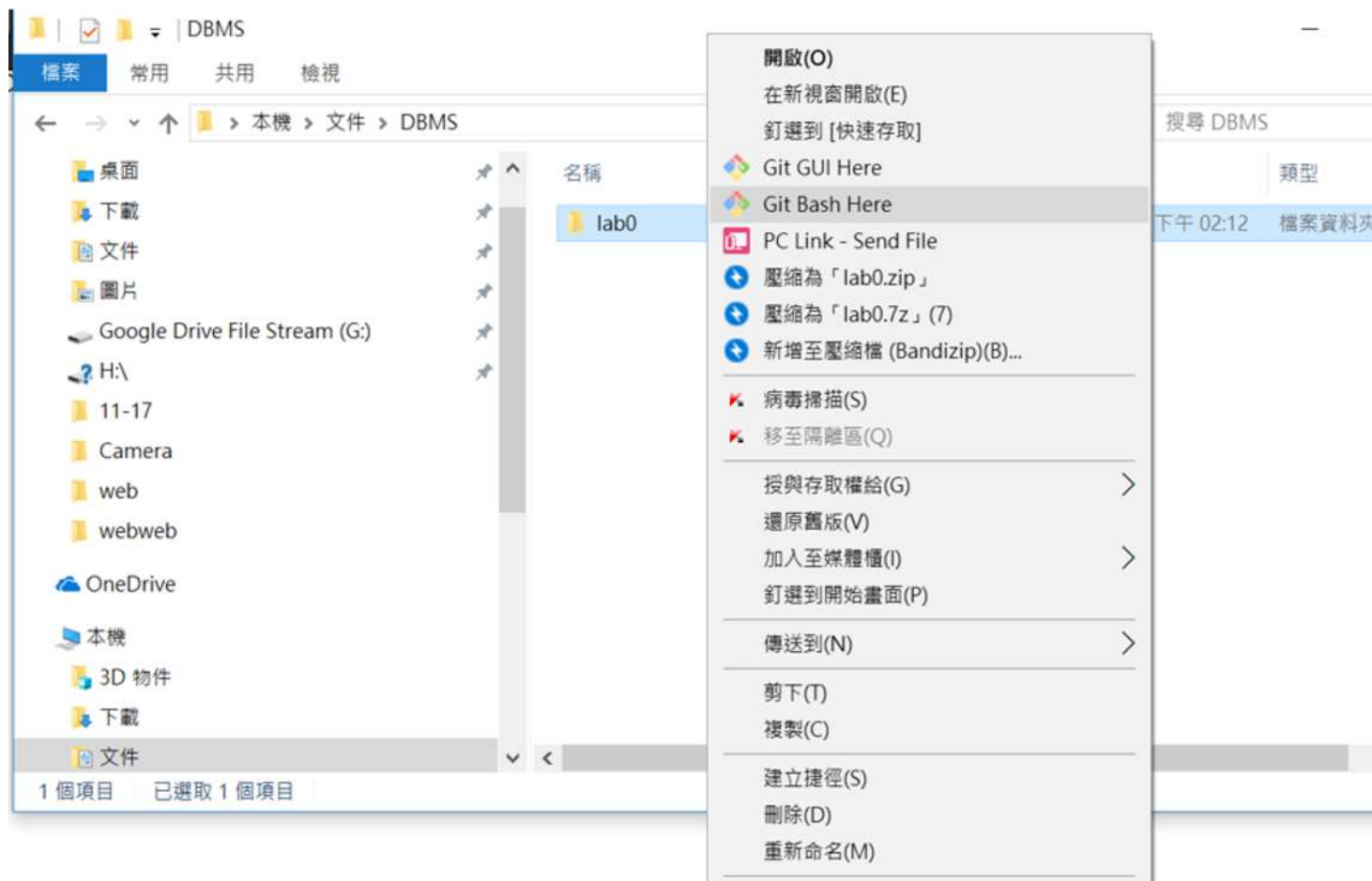
Clone with SSH

git@shwu10.cs.nthu.edu.tw:pywa

Clone with HTTPS

https://shwu10.cs.nthu.edu.tw/p

If You use Windows



```
yicchen@LAPTOP-V7AFEOV7 MINGW64 ~/Documents/DBMS/lab0
$ git clone https://shwu10.cs.nthu.edu.tw/ycchen/practice-submission.git
Cloning into 'practice-submission'...
remote: Counting objects: 3, done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 3 (delta 0)
Unpacking objects: 100% (3/3), done.

yicchen@LAPTOP-V7AFEOV7 MINGW64 ~/Documents/DBMS/lab0
$ ls
practice-submission/

yicchen@LAPTOP-V7AFEOV7 MINGW64 ~/Documents/DBMS/lab0
$
```

3. Create a folder to put your repos

```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0
$ git clone https://shwu10.cs.nthu.edu.tw/ycchen/practice-submission.git
Cloning into 'practice-submission'..
remote: Counting objects: 3, done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 3 (delta 0)
Unpacking objects: 100% (3/3), done.
```

4. Type "git clone {URL}"

```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0
$ ls
practice-submission/
```

5. The repo has been successfully cloned

```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0
$
```

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 4. Commit in your computer
 5. Push to Gitlab
 6. Send merge request of your branch to our template repository

```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0/practice-submission (master)
```

```
$ git add -A
```

1. -A means all files

```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0/practice-submission (master)
```

```
$ git status
```

```
On branch master
```

```
Your branch is up-to-date with the upstream branch.
```

2. Check if your file is added to git

```
Changes to be committed:
```

```
(use "git reset HEAD <file>..." to unstage)
```

```
new file:   practice.txt
```

```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0/practice-submission (master)
```

```
$ git commit -m "Finish"
```

```
[master 93a03d5] Finish
```

```
1 file changed
```

```
create mode 100644 practice.txt
```

3. Commit your changes


```
yicchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0/practice-submission (master)
```

```
$ git commit -m "Finish"
```

```
*** Please tell me who you are.
```

```
Run
```

```
git config --global user.email "you@example.com"  
git config --global user.name "Your Name"
```

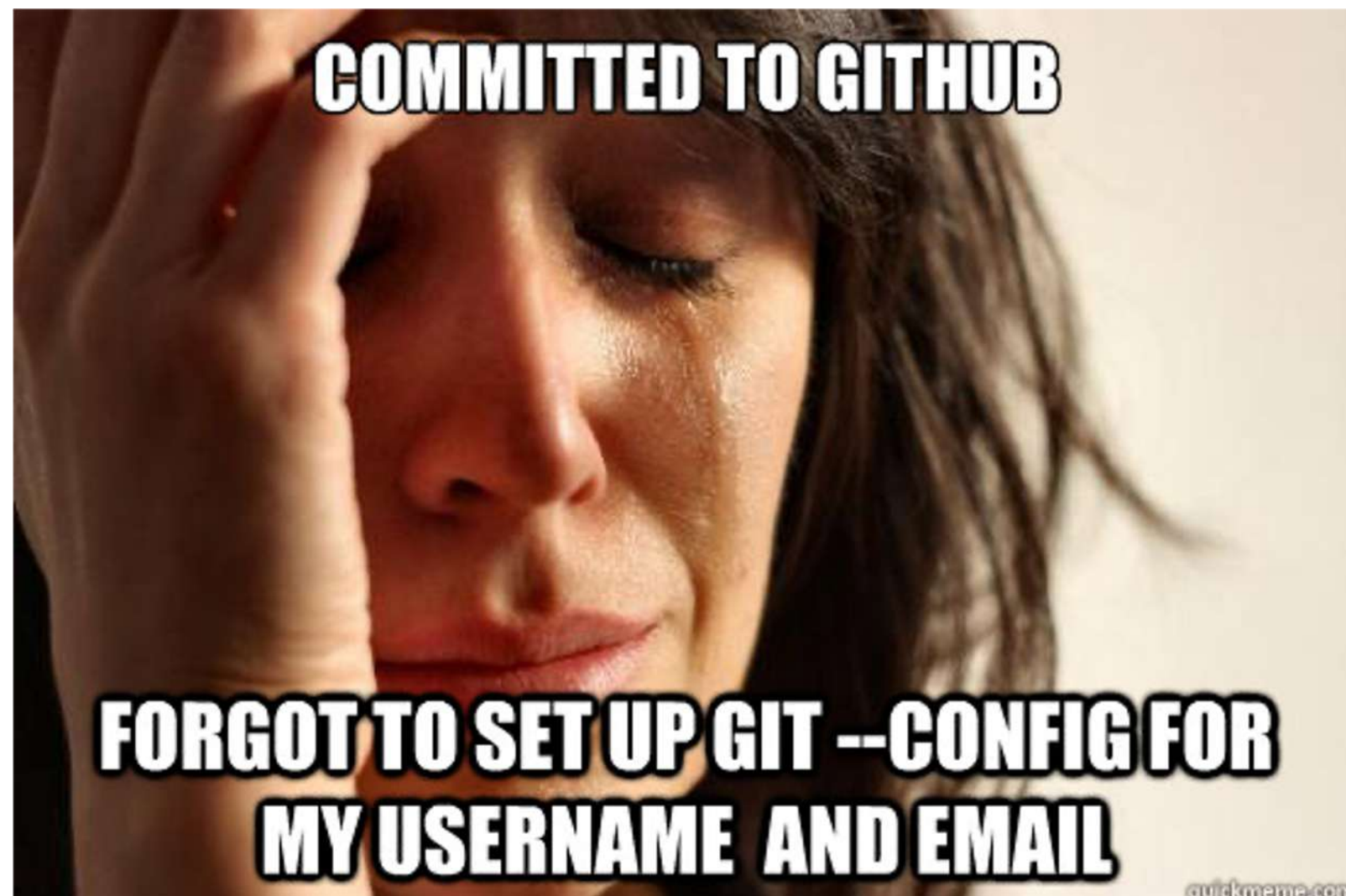
```
to set your account's default identity.
```

```
Commit --global to set the identity only in this repository
```

```
fatal: unable to auto-detect email address (got 'yicchen@LAPTOP-V7AFE0V7.(none)')
```

If you see these message, type
`git config --global user.name "{name}"`
`git config --global user.email "{email}"`

{email} is the email you use on gitlab



Workflow

- For each lab, you should follow the workflow below
 1. Fork our template repository on Gitlab
 2. Clone the forked repository to your computer
 3. Finish your lab
 4. Commit in your computer
 - 5. Push to Gitlab**
 6. Send merge request of your branch to our template repository

```
ycchen@LAPTOP-V7AFE0V7 MINGW64 ~/Documents/DBMS/lab0/practice-submission (master)
```

```
$ git push origin master
```

```
Counting objects: 3, done
```

```
Delta compression
```

```
Compressing object
```

```
Writing objects: 100% (3/3), 284 bytes | 284.00 KiB/s, done.
```

```
Total 3 (delta 0), reused 0 (delta 0)
```

```
To https://shwu10.cs.nthu.edu.tw/ycchen/practice-submission.git
```

```
21e2fda..93a03d5 master -> master
```

Type "git push -u origin master"

Workflow

- For each lab, you should follow the workflow below
 1. Fork our template repository on Gitlab
 2. Clone the forked repository to your computer
 3. Finish your lab
 4. Commit in your computer
 5. Push to Gitlab
 6. Send merge request of **your branch** to our template repository

GitLab

Projects ▾Groups ▾ActivityMilestonesSnippets

Search or jump to... 🔍

🔗🔗🔗🔗🔗🔗

P practice-submission

Project

Details

Activity

Releases

Cycle Analytics

Repository

Issues 0

Merge Requests 0

Wiki

Snippets

Members

<< Collapse sidebar

courses > ... > 2020-spring > practice-submission > Details

P practice-submission

Project ID: 9897

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1 Commit

1 Branch

0 Tags

41 KB Files

master ▾

practice-submission /

+ ▾

History

Find file 🔍

Web IDE

🔗 ▾

Initial commit

Yi-Chun Chen authored 6 hours ago

9af13851 🔗

Name	Last commit	Last update
README.md	Initial commit	6 hours ago

README.md

Practice Submission

This repository is built for practicing submissions for assignments and projects. You can follow the instructions below in order to know the whole workflow for submitting an assignment or a project.

1. Click Merge Requests

Projects ▾

Groups ▾

Activity

Milestones

Snippets

P

practice-submission

Project

Repository

Issues0

Merge Requests0

Wiki

Snippets

Members

<< Collapse sidebar

courses > ... > 2020-spring > practice-submission > Merge Requests

Merge requests are a place to propose changes you've made to a project and discuss those changes with others

Interested parties can even contribute by pushing commits if they want to.

New merge request

2. New merge request

GitLab

Projects Groups Activity Milestones Snippets

practice-submission

Project

Repository

Issues 0

Merge Requests 0

Wiki

Snippets

Settings

New Merge Request

Source branch

pywang/practice-submission

first commit
Pin-Yu Wang authored 10 minutes ago
6846e605

Compare branches and continue

Target branch

courses/databases/2020-spring/practic...

Initial commit
Yi-Chun Chen authored 7 hours ago
9af13851

3. Choose the branch you pushed in your repo

4. Choose the branch named after your ID

5. Compare branches

Projects ▾

Groups ▾

Activity

Milestones

Snippets

+

▼

This project

Search

Q

🔍

🔗

📄

📧

🌐

▼

P

practice-submission

🏠 Project

📁 Repository

🔖 Issues 0

🔗 Merge Requests 0

📖 Wiki

✂ Snippets

⚙ Settings

New Merge Request

From ycchen/practice-submission

Change branches

Title

std107000000 Submission

Start the title with **WIP:** to prevent a **Work In Progress** merge request from being merged before it's ready.

Add [description templates](#) to help your contributors communicate effectively!

Description

Write Preview

B I 🔗 </> ☰ ☷ 📷 🔄

finish|

Markdown and [quick actions](#) are supported

[Attach a file](#)

Assignee

Assignee ▼

[Assign to me](#)

Milestone

Milestone ▼

Labels

Labels ▼

Source branch

master ▼

Target branch

107000000 ▼

[Change branches](#)

☐ Squash commits when merge request is accepted. [About this feature](#)

6. Set title to "{ID} Submission"

Projects Groups Activity Milestones Snippets

P practice-submission

Project

Repository

Issues0

Merge Requests0

Wiki

Snippets

Settings

Markdown and quick actions are supported

Attach a file

Assignee

Assignee

Assign to me

Milestone

Milestone

Labels

Labels

Source branch

master

Target branch

107000000

Change branches

☐ Squash commits when merge request is accepted.

About this feature

Contribution

☐ Allow commits from members who can merge to the target branch.

About this feature

Submit merge request

Cancel

Commits1

Changes1

24 Feb, 2019

1 commit

Finish

Your Name authored 55 minutes ago

93a03d56

<< Collapse sidebar

7. If everything is OK,
submit your merge request

In case of fire



1. git commit




2. git push





3. leave building

P


practice-submission

 Project overview


 Repository


 Issues


0


 Merge Requests


0


 Operations


 Packages & Registries

 Analytics

 Wiki

 Snippets

 Members

 Settings

chanchishen > practice-submission > Members

Project members

You can invite a new member to **practice-submission** or invite another group.

Invite member

Invite group

GitLab member or Email address

Yu-Xuan Lin ✕

Choose a role permission

Maintainer

▾

[Read more](#) about role permissions

Access expiration date

Expiration date

Members 1

1. Click Members

Project members

You can invite a new member to **practice-submission** or invite another group.

Invite member

Invite group

GitLab member or Email address

Yu-Xuan Lin x

Choose a role permission

Maintainer

[Read more](#) about role permissions

Access expiration date

Expiration date

Invite

2. Set your members

3. Choose your members to be Maintainer

4. Click Invite

Members 1

Reference

- Learn Git branching (interactive)
 - <http://pcottle.github.io/learnGitBranching/>
- Pro Git
 - <http://git-scm.com/book/>
- 寫給大家的 Git 教學
 - <http://www.slideshare.net/littlebtc/git-5528339>