

Git的使用



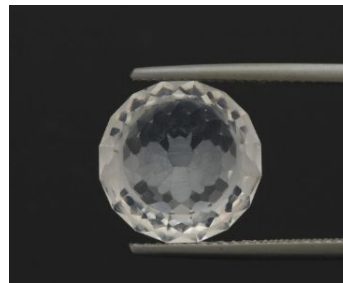
吳如峰

主要經歷:

貓頭鷹藝術科技總工程師

廣達集團高級工程師

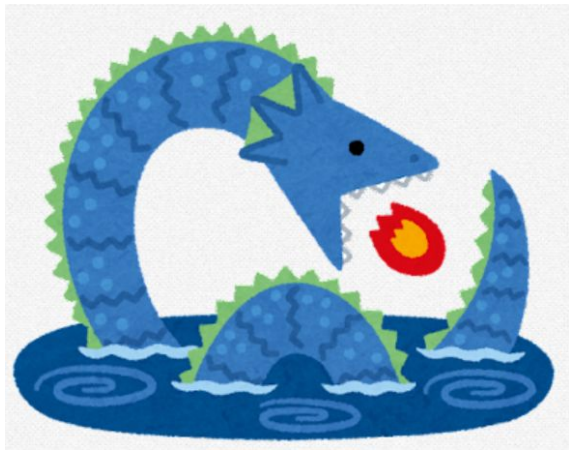
成功大學電機系控制組碩士



tw.fukuro-art-tech.com

git是什麼，為什麼要學？

打遊戲的時候



先記錄一下

git是什麼，為什麼要學？

If a :

#準備寫程式

else:

#準備寫程式

**有沒有辦法做一個紀錄
免得程式寫壞？**

git是什麼，為什麼要學？

1. 很醜
2. 版本差異不明
3. 如果內容很多，很麻煩



my_python_final.py

類型: Python File



my_python_final_1.py

類型: Python File



my_python_real_final.py

類型: Python File



my_python_real_final_1.py

類型: Python File



my_python_real_real_final.py

類型: Python File



my_python_v1.py

類型: Python File



my_python_v2.1.py

類型: Python File



my_python_v2.py

類型: Python File

git是什麼，為什麼要學？

很多開高薪水的公司需要

git

×

地區

▼

職務類別

☐ 只搜尋職務名稱

相關搜尋：API、JavaScript、Java、Python、Linux

職務

公司

更新日期 ▼

出勤制度 ▼

月薪4萬up ▼

經歷要求 ▼

公司相關 ▼

更多條件 ▼

排除條件 ▼

全部(1063)

全職(1060)

兼職(0)

高階(0)

其他 ▼

第 1 / 54 頁 ▼

符合度排序 ▼

git是什麼，為什麼要學？

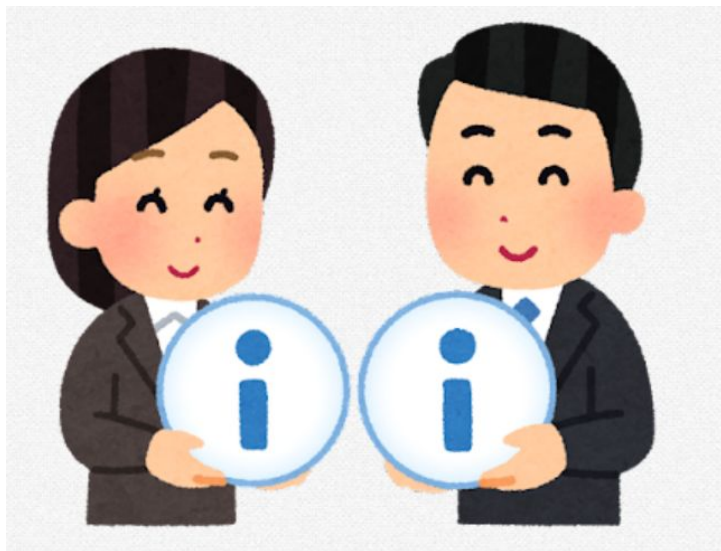
1000多個薪水4萬以上職缺是甚麼概念

The screenshot shows a job search interface. At the top, the search term 'python' is entered in a search bar and is circled in red. To the right of the search bar is a '地區' (Region) dropdown menu. Below the search bar, there is a checkbox labeled '只搜尋職務名稱' (Only search for job titles) and a list of related search terms: '軟體設計工程師' (Software Design Engineer), 'C++', 'Linux', 'Java', and '資訊工程' (Information Engineering). Below this, there are two tabs: '職務' (Job) and '公司' (Company), with '職務' being the active tab. Below the tabs, there are several filter options: '更新日期' (Update Date), '出勤制度' (Attendance System), '月薪4萬up' (Monthly Salary 40,000 and up), '經歷要求' (Experience Requirements), '公司相關' (Company Related), and '更多條件' (More Conditions). The '月薪4萬up' filter is circled in red. Below the filters, there are several buttons: '全部(897)' (All 897), '全職(881)' (Full-time 881), '兼職(0)' (Part-time 0), '高階(0)' (Senior 0), and '其他' (Other). The '全部(897)' button is circled in red. To the right of these buttons is a page indicator showing '第 1 / 45 頁' (Page 1 of 45).

Git是高階人才必備的能力!

你對於版本管控的期待？

你覺得版本管控，需要什麼樣的功能？



來安裝Git吧!

Git for Windows

Download for Windows

[Click here to download](#) the latest (2.35.1) 64-bit version of **Git for Windows**. This is the most recent [maintained build](#). It was released **16 days ago**, on 2022-02-01.

Other Git for Windows downloads

Standalone Installer

[32-bit Git for Windows Setup.](#)

[64-bit Git for Windows Setup.](#)

Portable ("thumbdrive edition")

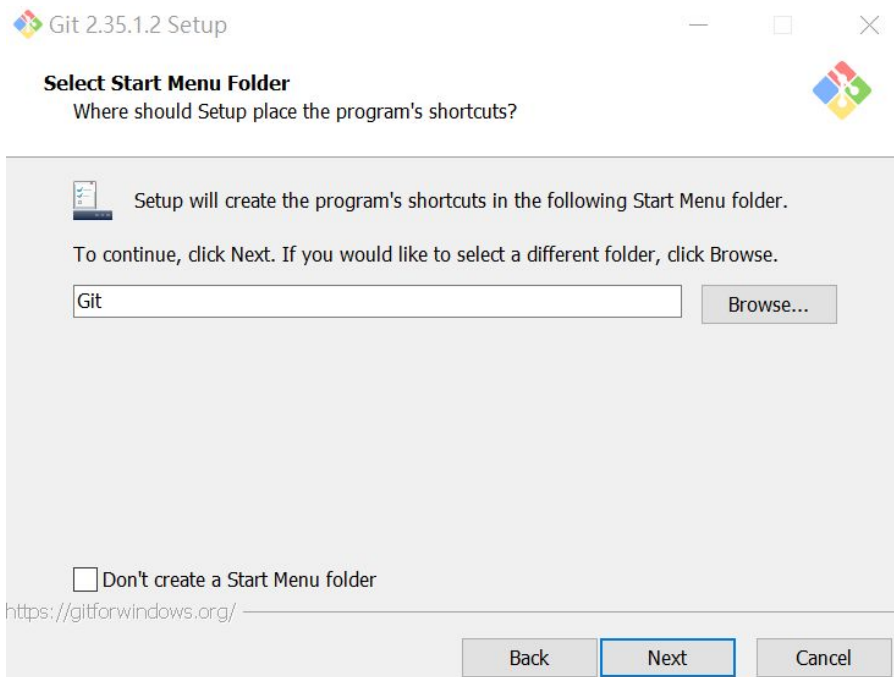
[32-bit Git for Windows Portable.](#)

[64-bit Git for Windows Portable.](#)

<https://w3c.hexschool.com/git/fd6f6be> -> mac請參考這裡

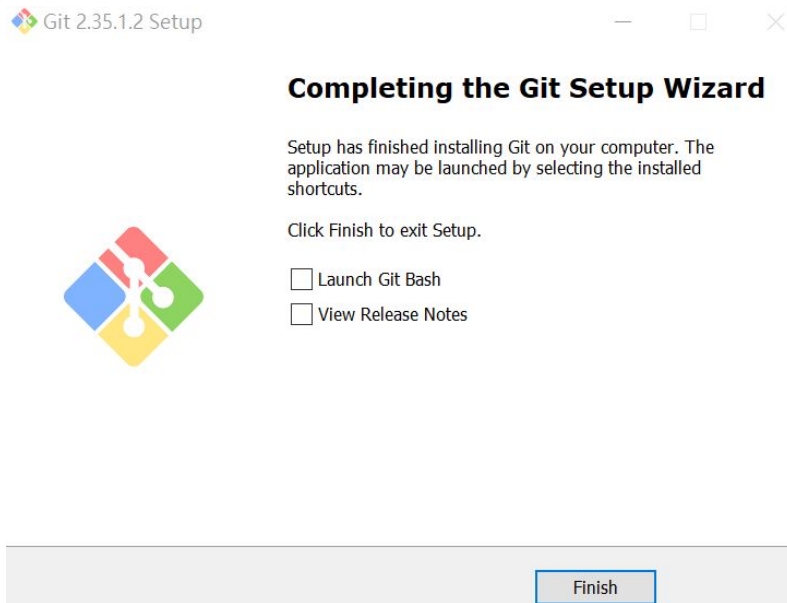
來安裝Git吧!

按Next就對了



來安裝Git吧!


看到這樣就表示成功了



請大家來一起安裝吧!

來開始使用GIT吧

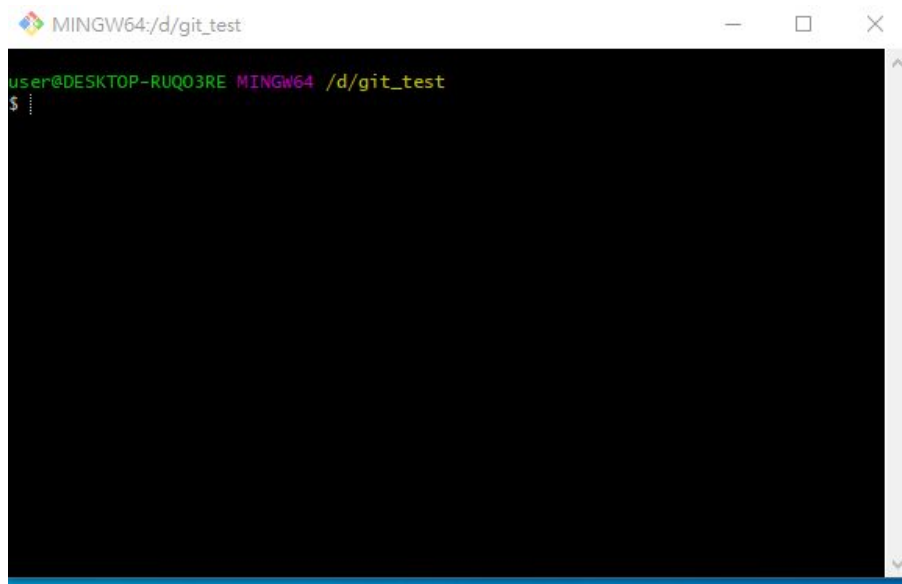
我們會發現多了兩個東西

 git_test.txt



Git Bash

可以讓你下命令用的

A screenshot of a Git Bash terminal window. The window title bar shows 'MINGW64:/d/git_test' with standard Windows window controls (minimize, maximize, close). The terminal content shows a green prompt 'user@DESKTOP-RUQ03RE MINGW64 /d/git_test' followed by a white '\$' symbol and a cursor. The terminal background is black, and the text is green and white. The window has a blue border at the bottom.

```
MINGW64:/d/git_test  
user@DESKTOP-RUQ03RE MINGW64 /d/git_test  
$
```

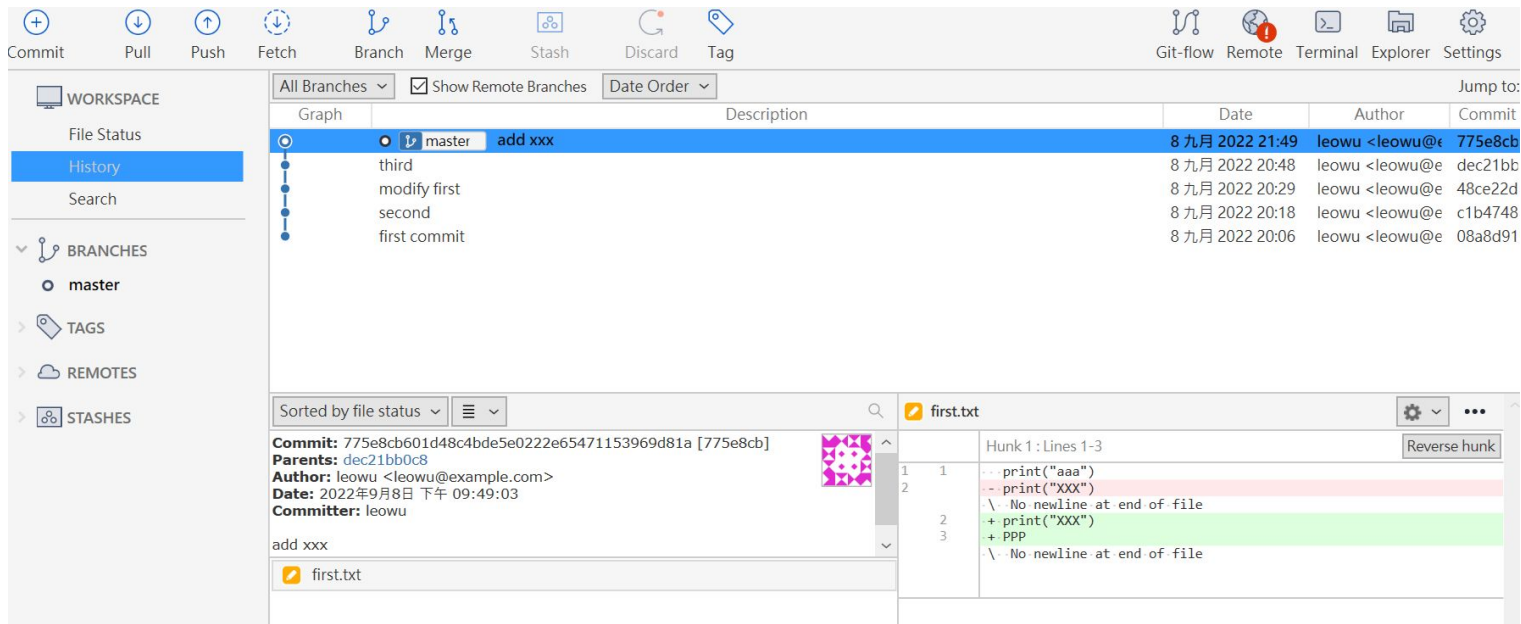
Git GUI

按下GIT GUI會出現的樣式



表示這裡沒有GIT的倉儲(repository)

我們可以去下載更強大的GUI來使用-source tree



<https://www.sourcetreeapp.com/>

source tree



- ☒ Install
- ☐ **Registration**
- ☐ Install tools
- ☐ Preferences

Registration

Sourcetree is a free product that requires a one-time registration using your Atlassian Bitbucket account. You can connect additional accounts such as Github, Gitlab, Visual Studio Team Services, etc. once logged in.



Bitbucket Server



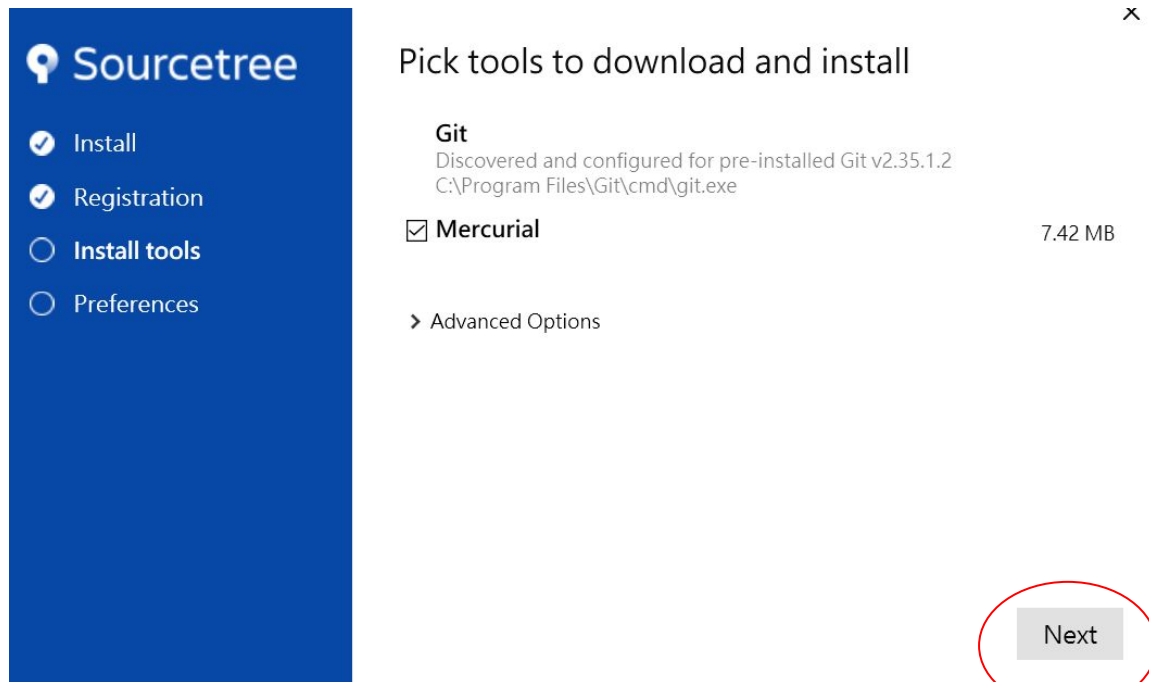
Bitbucket

Don't have a Bitbucket Cloud account? [Create one for free.](#)

Skip


Next

source tree



失敗的話, 回到這一個畫面還是可以按 next

輸入自己的email和名字

 Sourcetree

☒ Install

☒ Registration

☒ Install tools

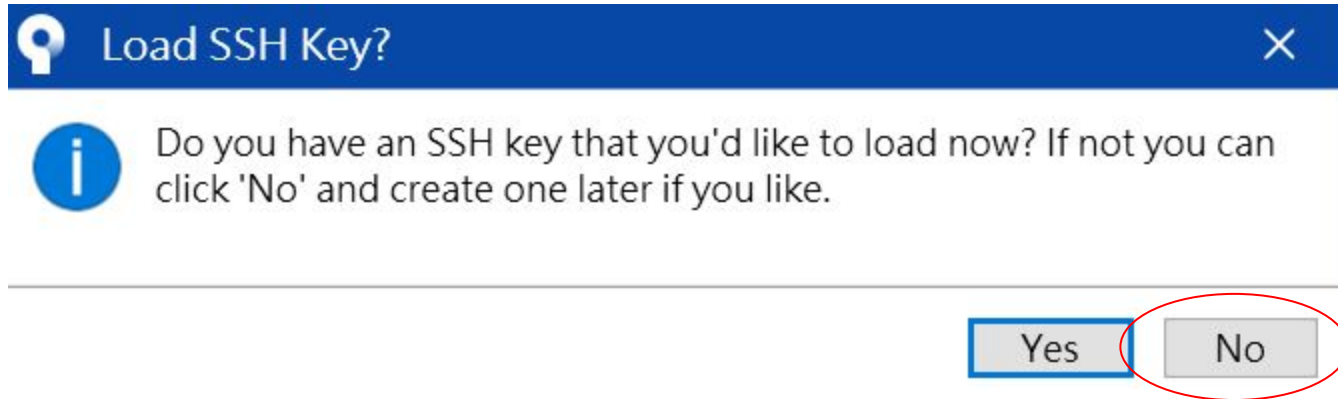
☐ Preferences

Preferences

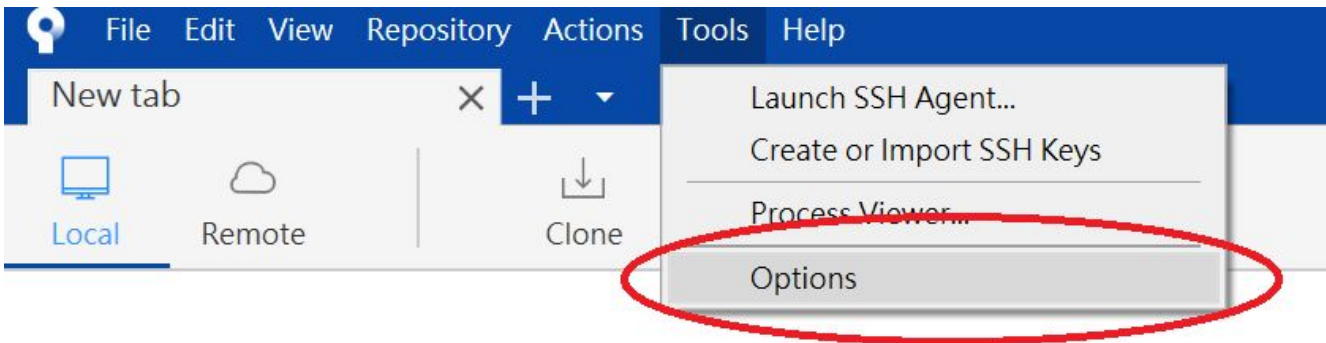
Before we finish, take a moment to configure these settings.

Next

source tree



在source tree上設定名字



Local repositories

Default user information

Full Name: leowu

Email address: leowu@example.com

利用cmd設定自己的名字

在建立之前，請先輸入你的email和名稱

```
git config --global user.email "你的email"
```

```
git config --global user.name "你的名字"
```

讓未來團隊合作的時候知道是誰做了什麼動作

如果要看自己輸入了什麼

在建立之前, 請先輸入你的email和名稱

git config user.name -> 顯示你的名字

git config user.email -> 顯示你的email

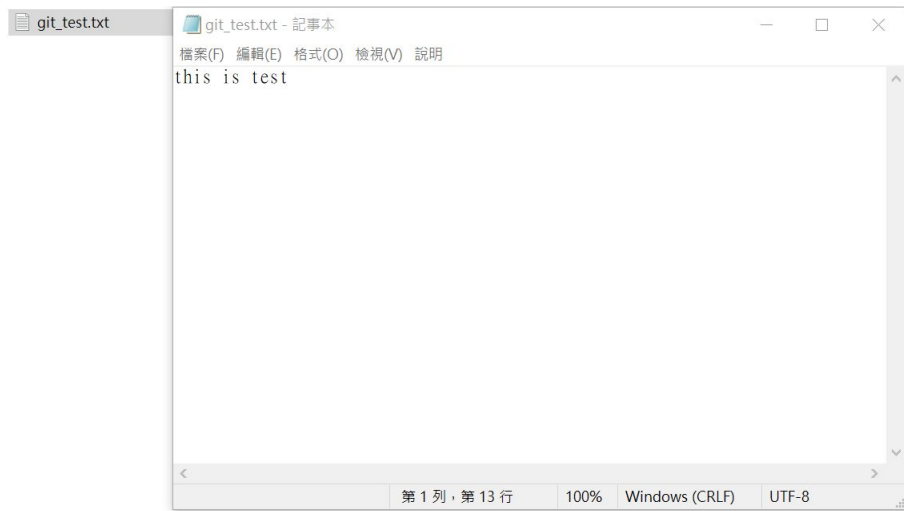
如果你要重新修改自己的名字和email

git config --global user.email "你的email"

git config --global user.name "你的名字"

建立GIT的第一個倉儲

終於要建立第一個倉儲了!



先產生一個txt檔案, 裡面寫一些內容



狀況題

在mac中沒有辦法案右鍵新增資料夾怎麼辦？

1. 打開終端機
2. `mkdir <新的資料夾>`
3. 如果失敗的話, 加入`sudo`
4. `cd <新的資料夾>`
5. `touch <新的檔案>`

打開「終端機」

在 Mac 上執行下列其中一項操作：

- 按一下 Dock 中的「啟動台」圖像 ，在搜尋欄位中輸入「終端機」，然後按一下「終端機」。
- 在 Finder  中，打開「/應用程式/工具程式」檔案夾，然後按兩下「終端機」。

建立GIT的第一個倉儲

名稱

git_test

類型

文字文件

MINGW64:/d/git_test

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test
$ git init
Initialized empty Git repository in D:/git_test/.git/

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ |
```

狀況題

如果是在mac要如何切換到目前資料夾的位置？

方法1

1. 先找到目標資料夾的檔案位置

<https://www.maccleanerfree.com/copy-file-folder-path-from-mac-finder/>

2. 下以下cmd
cd <你的資料夾的位置>

方法2

1. 先進行設定 <https://www.goston.net/2013/11/19/4381/>
2. 按滑鼠右鍵, 選單中選擇「服務」下的「新增位於檔案夾位置的端終機標籤頁」

如何知道建立好了？

名稱	大小	類型
.git		檔案資料夾
git_test.txt	1 KB	文字文件

如果你有開隱藏資料夾
裡面就會有一個.git的隱藏資料夾

如何知道建立好了？

比較好的做法

看現在的狀態

看狀態

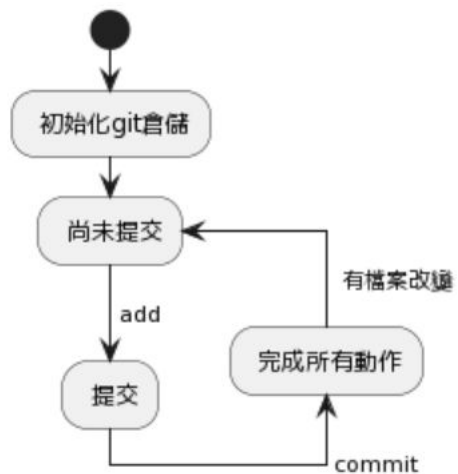
```
$ git status
On branch master
No commits yet
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    git_test.txt

nothing added to commit but untracked files present (use "git add" to track)
```

尚未commit?

GIT 的狀態

你的倉儲/檔案會有四個狀態



Git status 可以讓你看在哪一個狀態內

看狀態

```
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    git_test.txt

nothing added to commit but untracked files present (use "git add" to track)
```

紅色是表示檔案在尚未提交的狀態

轉到提交的狀態

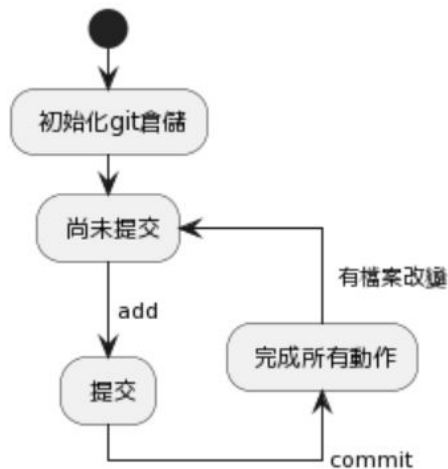
```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git add git_test.txt

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   git_test.txt
```

利用add <file>的指令改變狀態到“提交”



轉到提交的狀態

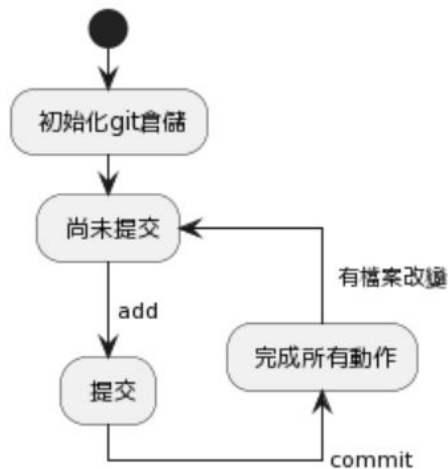
```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git add git_test.txt

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   git_test.txt
```

綠色是指檔案到“提交”的狀態



取消提交的狀態

如果要反悔

```
Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   git_test.txt

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git reset git_test.txt

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    git_test.txt

nothing added to commit but untracked files present (use "git add" to track)
```

git reset <file_name>

轉到提交的狀態

如果要一次提交所有的東西

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git add .

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git status
On branch master

No commits yet

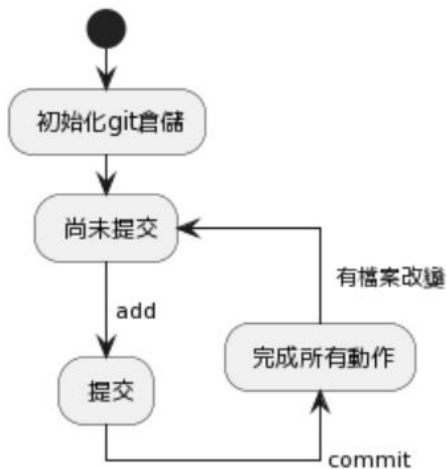
Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   git_test.txt
```

add和.之間要有空格

git add .

準備完成所有動作

利用commit完成所有的動作



下commit錯誤

如果沒有輸入email和姓名會這樣

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git commit -m 'first commit'
Author identity unknown

*** 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.
Omit --global to set the identity only in this repository.

fatal: unable to auto-detect email address (got 'user@DESKTOP-RUQ03RE.(none)')
```

準備完成所有動作

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git commit -m 'first commit'
[master (root-commit) c495e8e] first commit
1 file changed, 1 insertion(+)
create mode 100644 git_test.txt
```

‘’內的是這個版本的說明

```
$ git status
On branch master
nothing to commit, working tree clean
```

再看一次狀態，沒有檔案有變化

再試一次

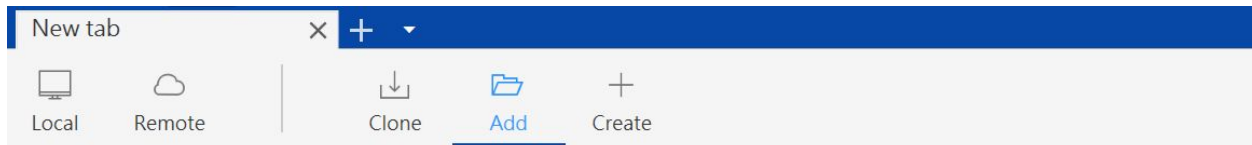
打開檔案，隨便改一下，看看狀況

```
$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   git_test.txt

no changes added to commit (use "git add" and/or "git commit -a")
```

這一個檔案被修改
又準備下次的循環了

這次用GUI來用吧 -sourceTree



Add a repository

Choose a working copy repository folder to add to Sourcetree

C:\Users\leo.wu\Desktop\git-test

Browse

Repository Type: ? This is a Git repository

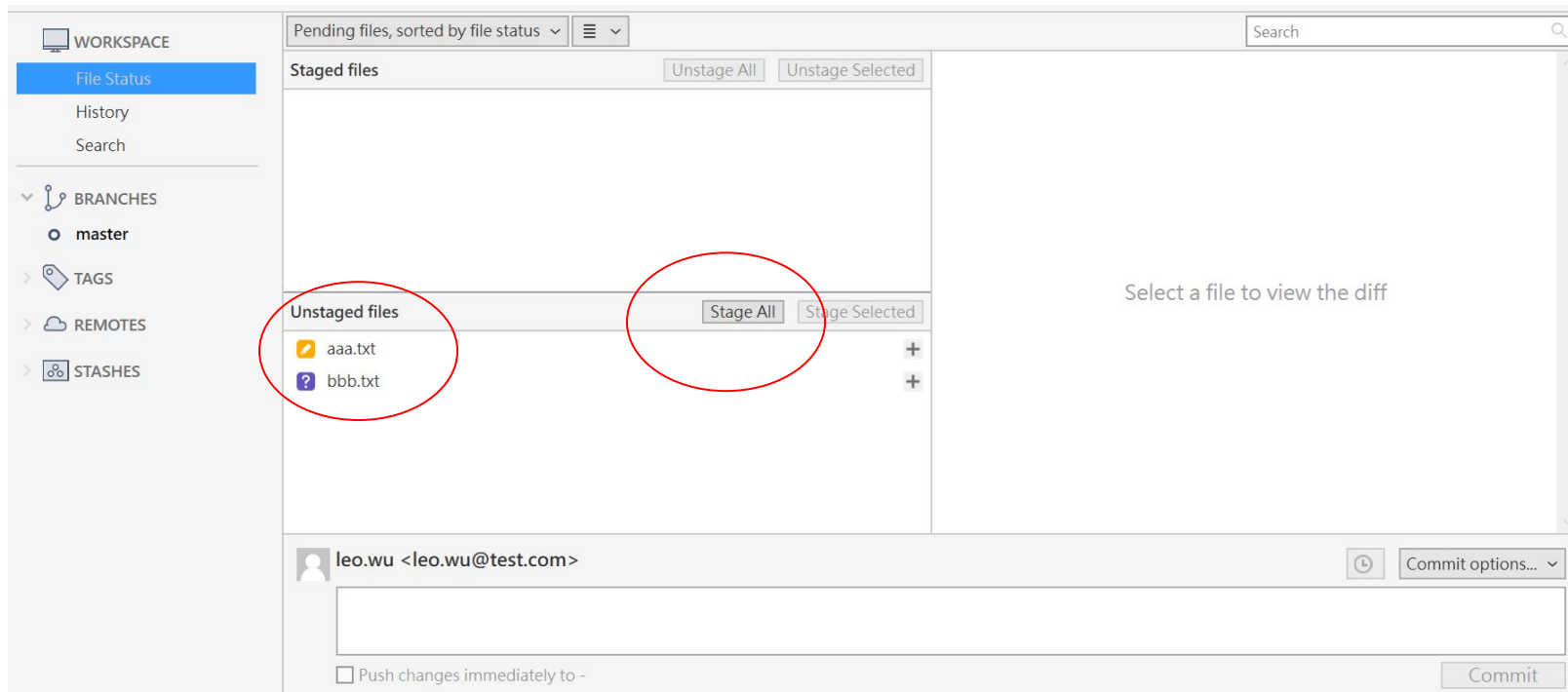
git-test

Local Folder:

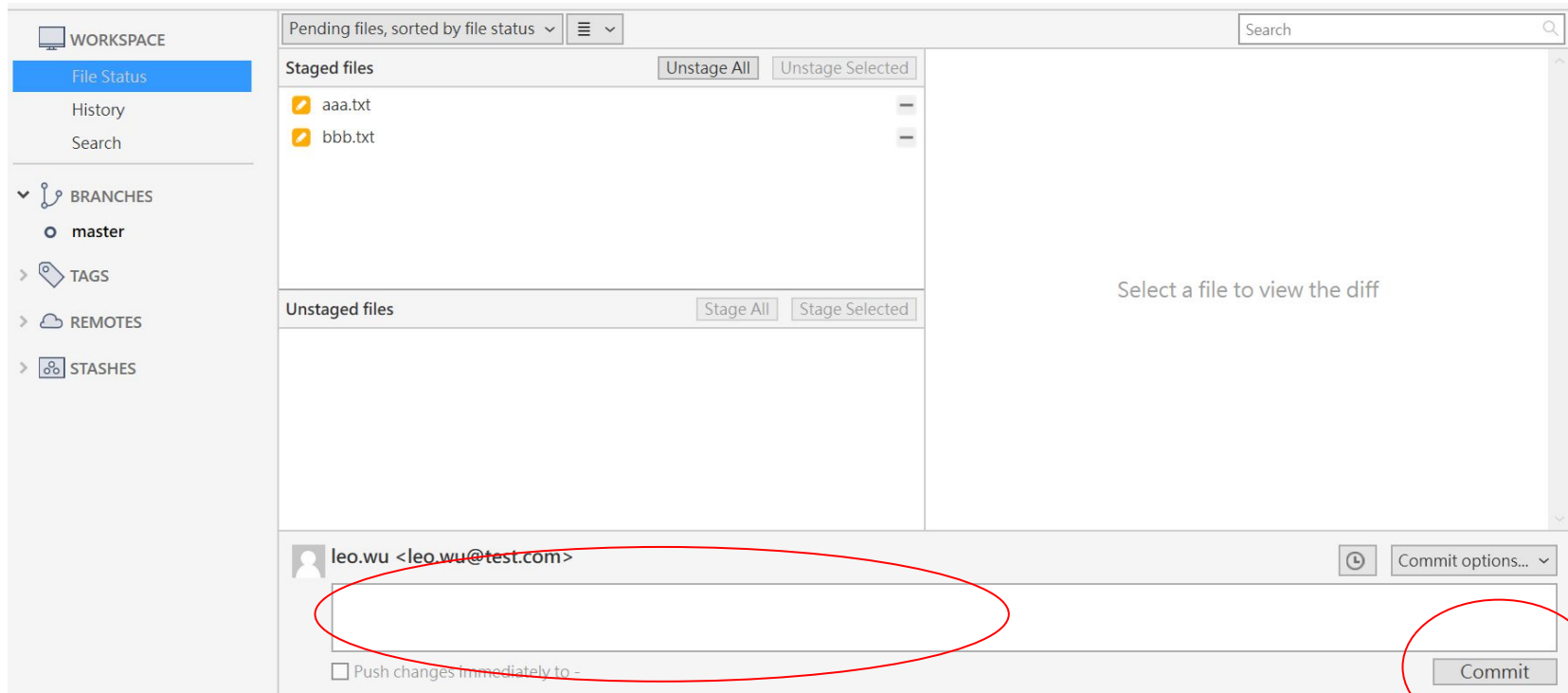
[Root]

Add

sourceTree 檔案修改



sourceTree 檔案修改



sourceTree看歷史紀錄

The screenshot displays the SourceTree application interface. On the left, a sidebar contains navigation options: WORKSPACE, File Status, History (highlighted), Search, BRANCHES (with master selected), TAGS, REMOTES, and STASHES. The main area is divided into two sections. The top section shows a commit history table with columns for Graph, Description, Date, Author, and Commit. The bottom section shows a file diff for 'aaa.txt' with a 'Hunk 1: Lines 1-2' view, including a 'Reverse hunk' button. Below the diff, a file list shows 'aaa.txt' and 'bbb.txt'.

Graph	Description	Date	Author	Commit
	third	11 九月 2022 10:45	leo.wu <leo.wu@>	119c77b
	second commit	11 九月 2022 10:46	leo.wu <leo.wu@>	c7f8b78
	first commit	11 九月 2022 10:45	leo.wu <leo.wu@>	c49e8c3

Sorted by file status

Commit: 119c77ba3f29dc5054399a1d0d6c12e8f72698c7 [119c77b]
Parents: c7f8b78931
Author: leo.wu <leo.wu@test.com>
Date: 2022年9月11日 上午 10:49:13
Committer: leo.wu

third

aaa.txt

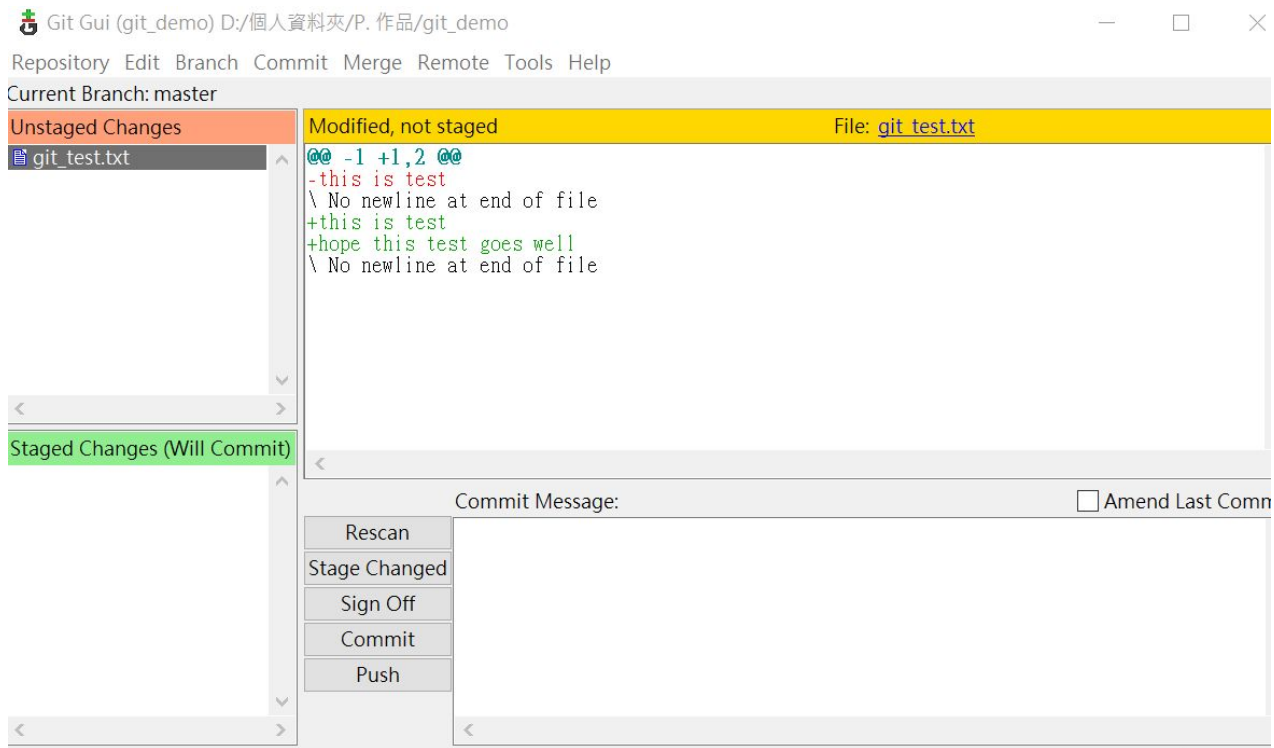
bbb.txt

Hunk 1: Lines 1-2

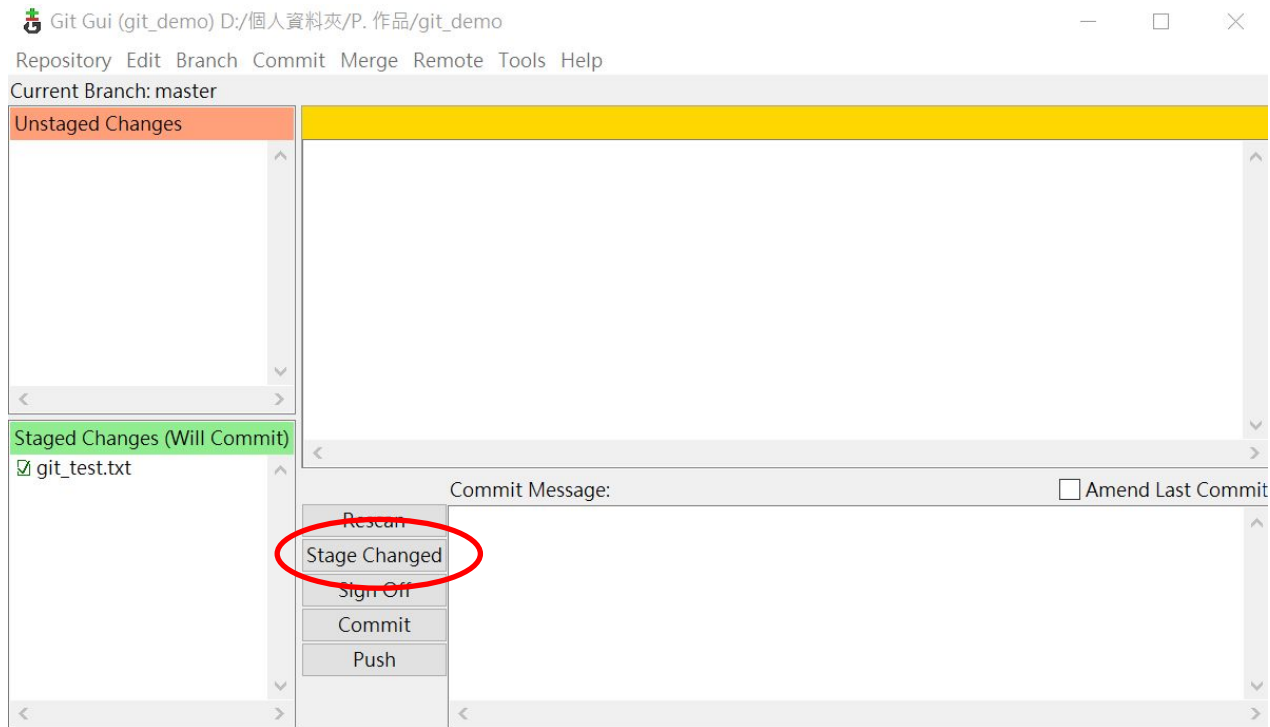
Reverse hunk

```
-- xxx
\..No newline at end of file
+ xxx
+ ccc
\..No newline at end of file
```

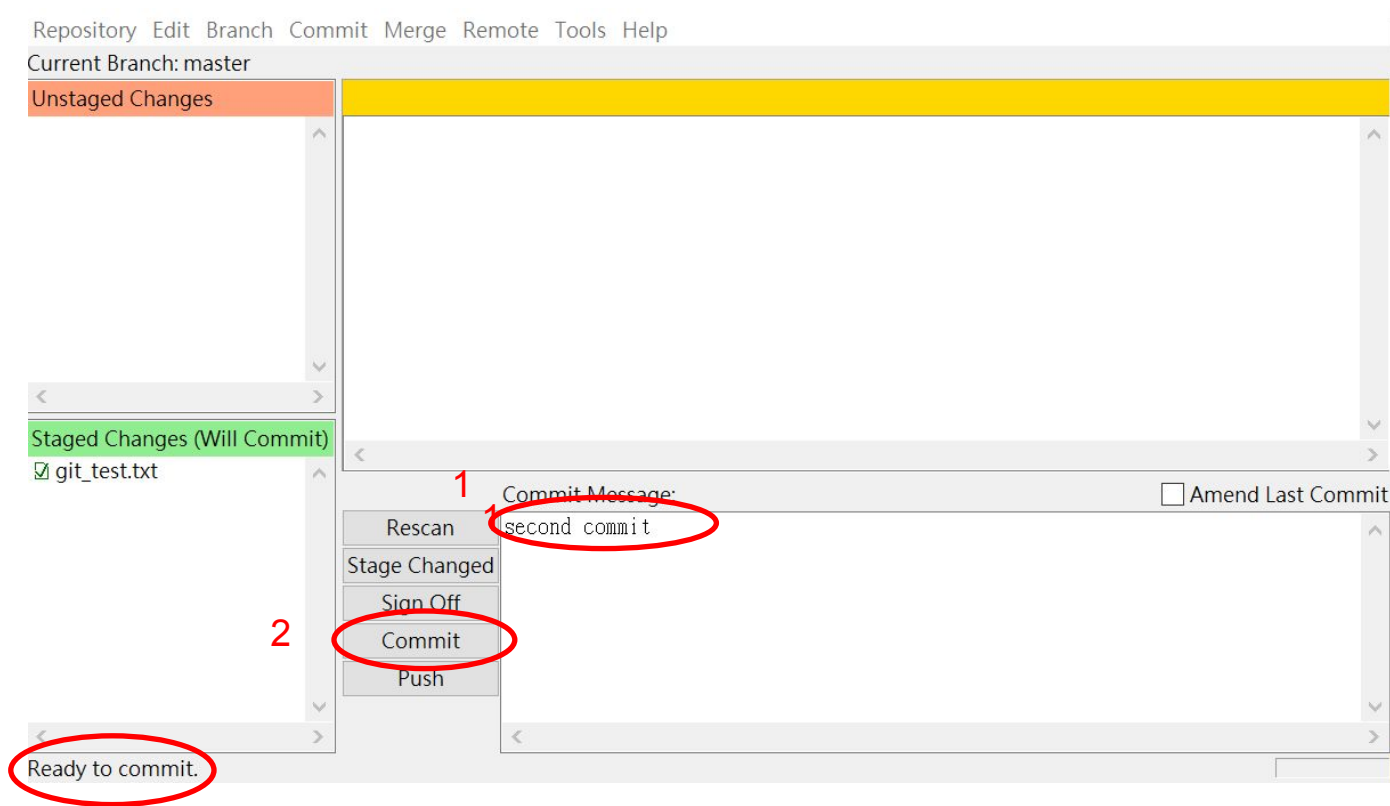
這次用GUI來用吧 - gitk



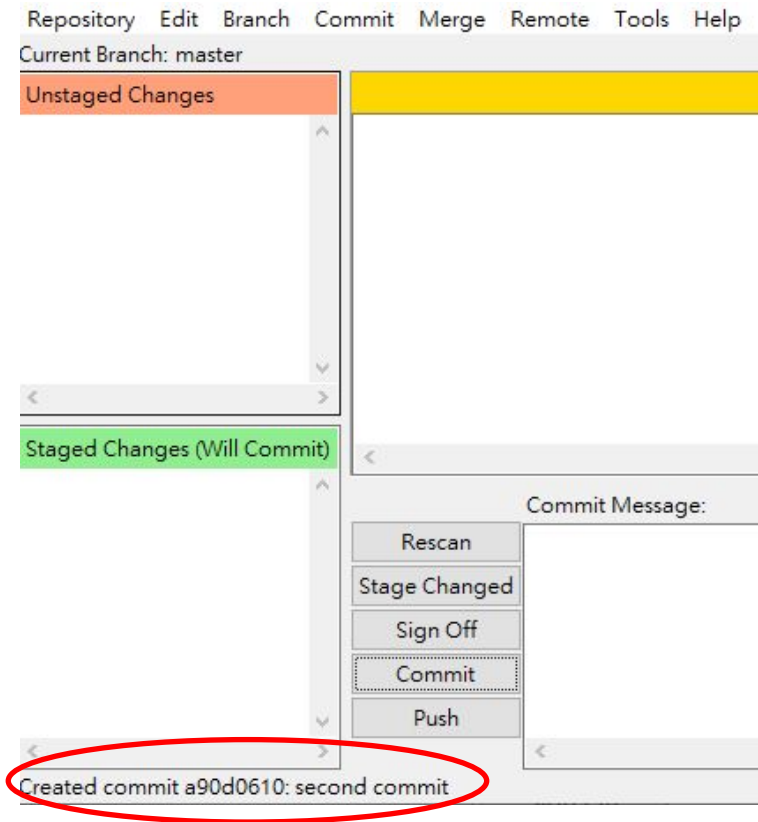
要變換到提交的狀態 - gitk



準備完成所有動作 - gitk



完成所有動作 - gitk



問題-我要怎麼看到所有的版本?

```
$ git log
commit a90d06102a68cd38b39b836ba27483d4ab352a62 (HEAD -> master)
Author: leo.wu <leo.wu>
Date: Mon Mar 14 10:33:25 2022 +0800

    second commit

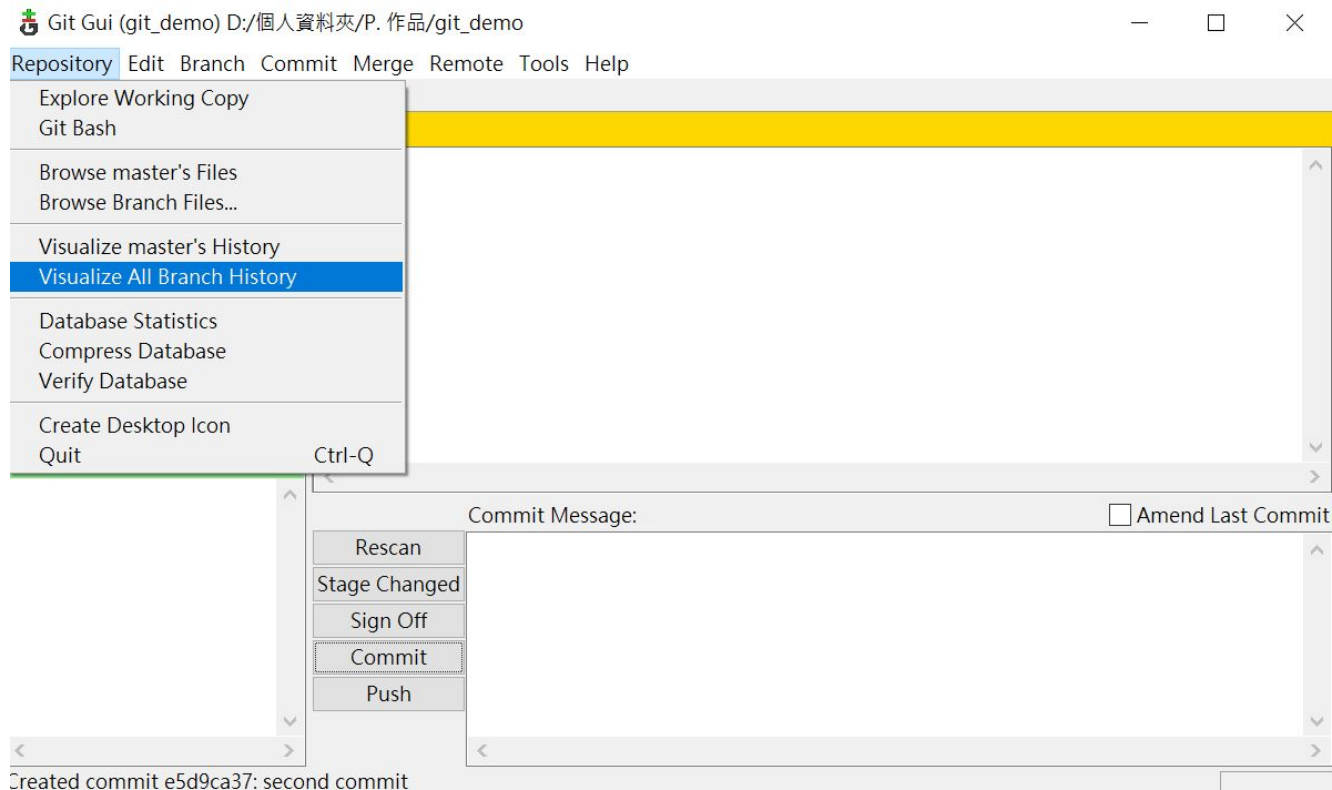
commit c495e8ee510ce299cdb873bb0406e0fa29af9648
Author: leo.wu <leo.wu>
Date: Mon Mar 14 10:31:05 2022 +0800

    first commit
```

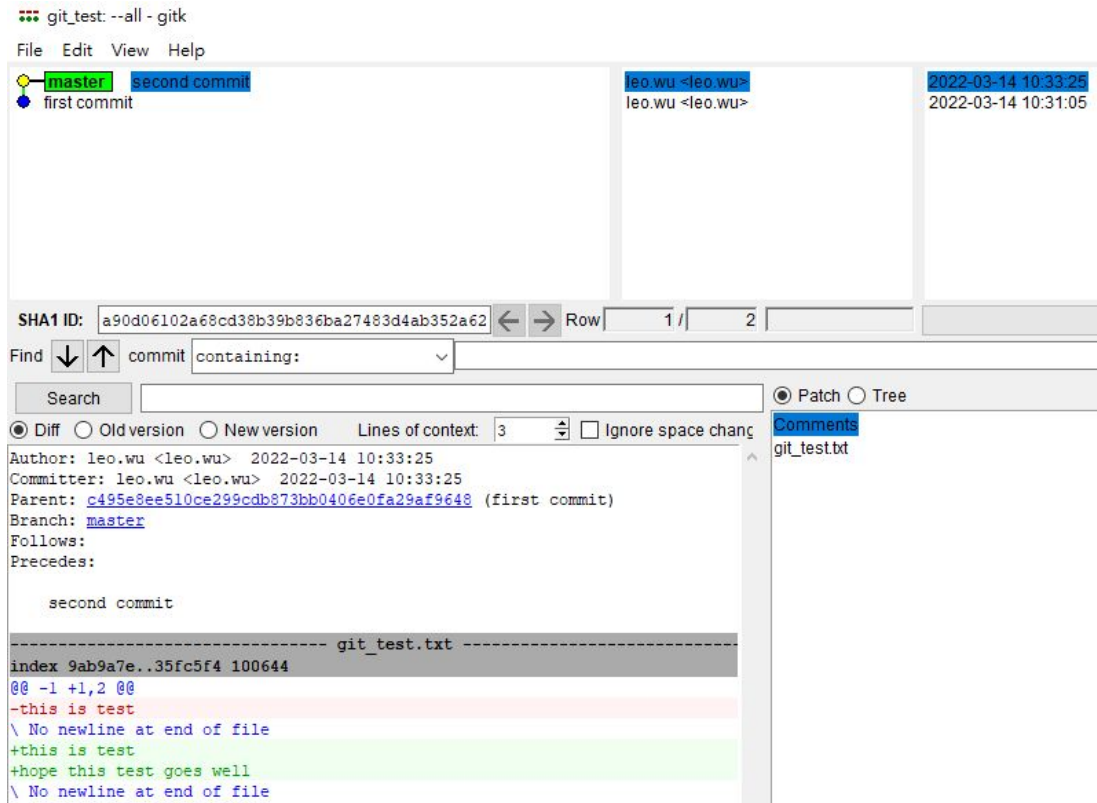
剛剛的版本全部都出來了

16進位版本號碼

有沒有更好的方式？



gitk – 可以看到所有的狀態



這有哪一些資訊?

黃色是目前的位址

16進位版本號碼

誰?
什麼時候?
版本的敘述

上一版本
跟這一版差別

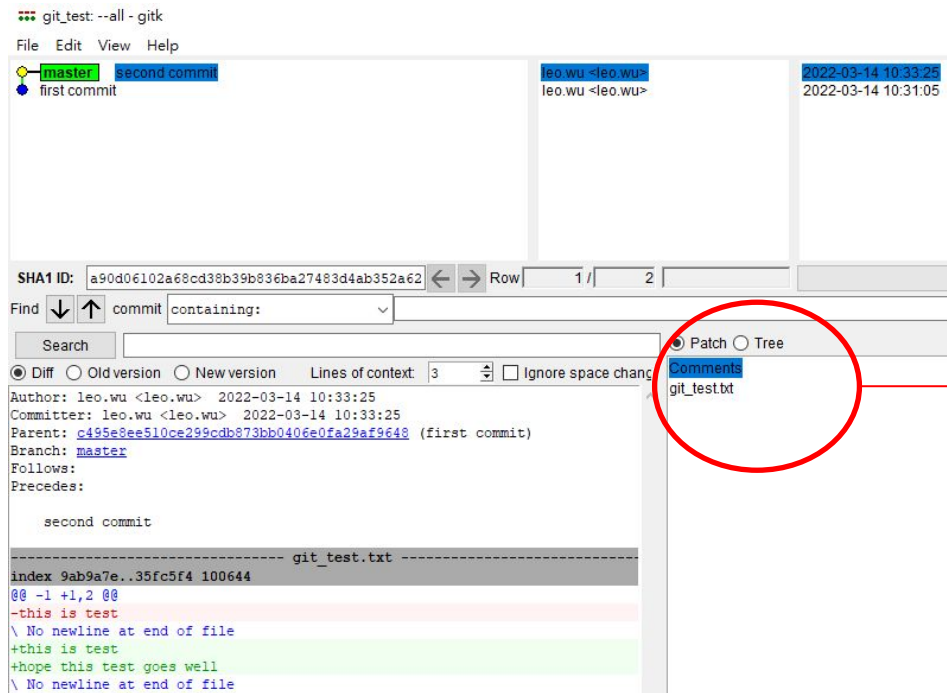
```
git_test: --all - gitk
File Edit View Help
master second commit
first commit
leo.wu <leo.wu>
leo.wu <leo.wu>
2022-03-14 10:33:25
2022-03-14 10:31:05

SHA1 ID: la90d06102a68cd38b39b836ba27483d4ab352a62 Row 1 / 2
Find commit containing:
Search
Diff Old version New version Lines of context: 3 Ignore space changes
Author: leo.wu <leo.wu> 2022-03-14 10:33:25
Committer: leo.wu <leo.wu> 2022-03-14 10:33:25
Parent: c495e8ee510ce299cdb873bb0406e0fa29af9648 (first commit)
Branch: master
Follows:
Precedes:

second commit

----- git_test.txt -----
index 9ab9a7e..35fc5f4 100644
@@ -1 +1,2 @@
- this is test
\ No newline at end of file
+ this is test
+ hope this test goes well
\ No newline at end of file
```

這有哪一些資訊？



哪一些檔案被修改了

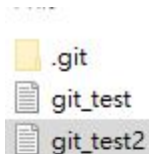
要如何回到之前的狀態？



我們做紀錄的重點是
要能回到過去

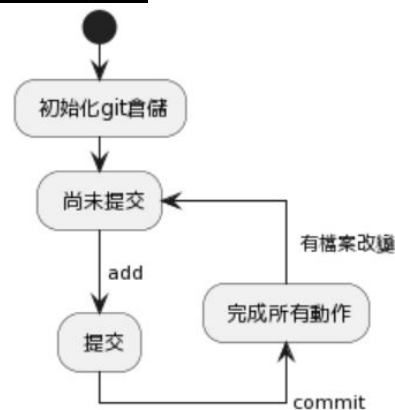
再多設定一版

首先，我們增加一個檔案並且記錄



```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be committed)
  git_test2.txt

nothing added to commit but untracked files present (use "git add" to track)
g
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git add .
git
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git commit -m 'third commit'
[master a9c74bd] third commit
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 git_test2.txt
```

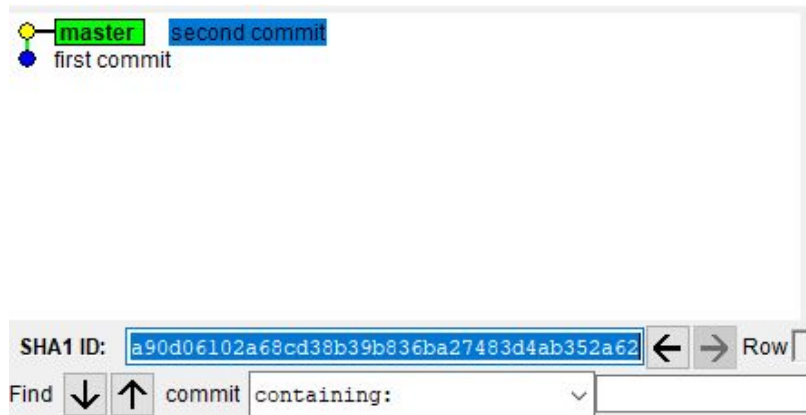


準備回到過去



回到過去

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git reset --hard a90d
HEAD is now at a90d061 second commit
```




恭喜搭乘時光機回到過去

可是，我後悔了

如果你想要回到第三版

```
$ git reflog  
a90d861 (HEAD -> master) HEAD@{0}: reset: moving to a90d  
a9c74bd HEAD@{1}: commit: third commit  
a90d061 (HEAD -> master) HEAD@{2}: commit: second commit  
c495e8e HEAD@{3}: commit (initial): first commit
```



找出第三版的版本編號

可是，我後悔了

```
$ git reflow
a90d061 (HEAD -> master) HEAD@{0}: reset: moving to a90d
a9c74bd HEAD@{1}: commit: third commit
a90d061 (HEAD -> master) HEAD@{2}: commit: second commit
c495e8e HEAD@{3}: commit (initial): first commit

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git reset --hard a9c74bd
HEAD is now at a9c74bd third commit
```



我們又回來了!

Git 分支

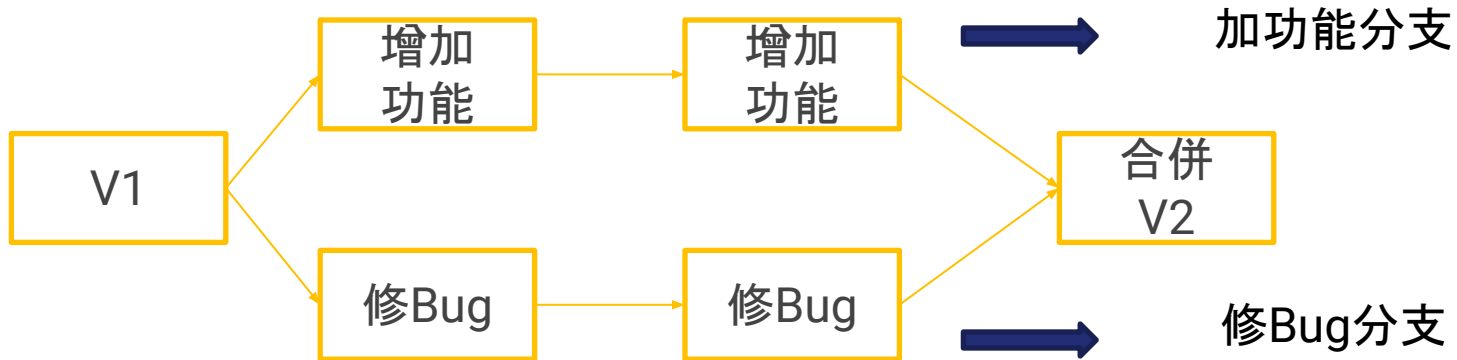
分支算是Git的最大特色



為什麼要使用分支？

Git 分支

舉個例子



確定分支

先來看看有哪一些分支

```
$ git branch  
* master
```

master

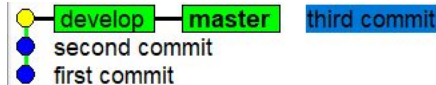
目前有一個叫做master的分支

開分支

開一個develop的分支

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git branch develop

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git branch
  develop
* master
```



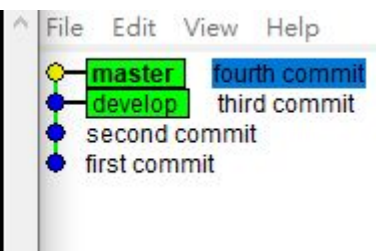
```
2022-02-21 11:20:28
2022-02-18 15:53:04
2022-02-18 15:35:29
```

多了一個叫做develop的分支
但是目前在master這一個分支內

如果這時候提交

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git add .

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git commit -m 'fourth commit'
[master 22dfb18] fourth commit
1 file changed, 2 insertions(+)
```



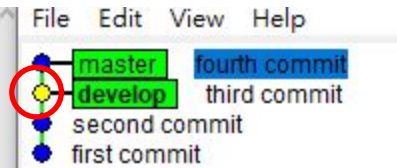
提交的內容是在master的分支無誤

切換分支

切換成develop分支

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git checkout develop
Switched to branch 'develop'

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (develop)
$
```

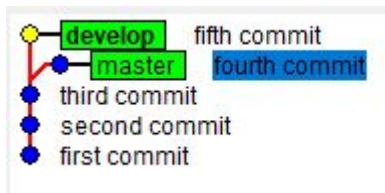


可以看到黃色的點回到develop上

如果這時候提交

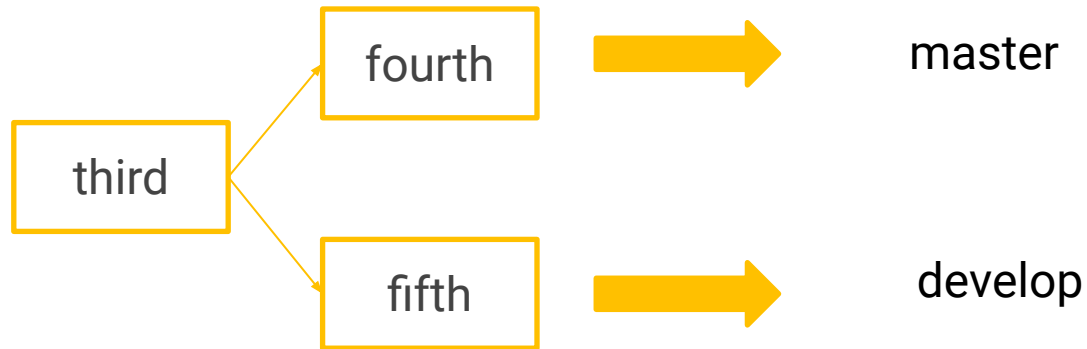
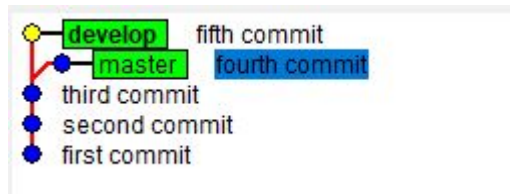
```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (develop)
$ git status
On branch develop
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   git_test2.txt

no changes added to commit (use "git add" and/or "git commit -a")
g
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (develop)
$ git add .
git
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (develop)
$ git commit -m 'fifth commit'
[develop ace0734] fifth commit
1 file changed, 2 insertions(+)
```

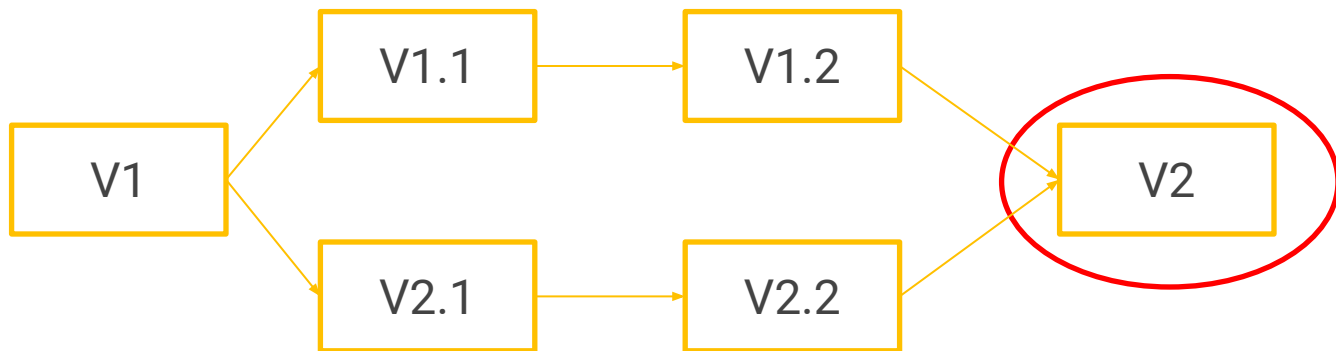


終於有分支的感覺了？

現在的情況



分支合併



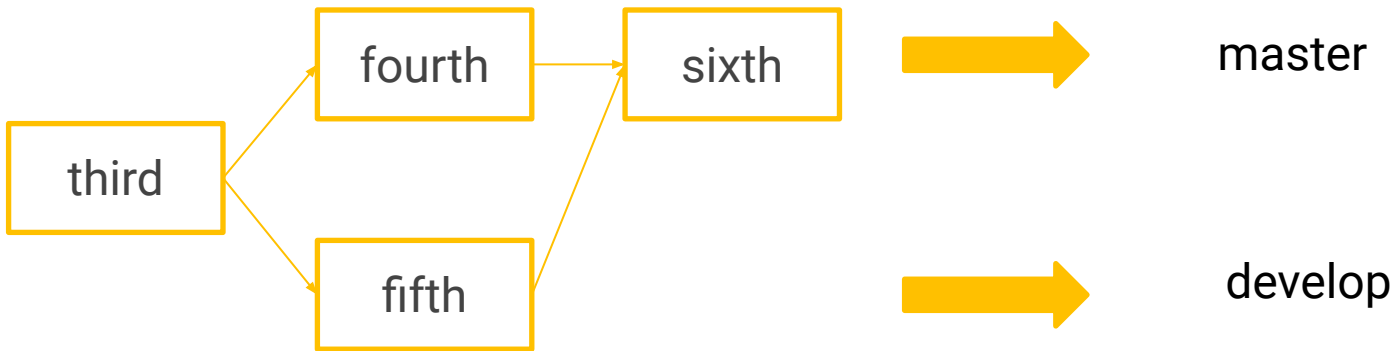
開發完成之後，我們需要合併分支

分支合併

1. 回到master的分支
2. 將develop 合併到master

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (develop)
$ git checkout master
Switched to branch 'master'

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git merge develop
```

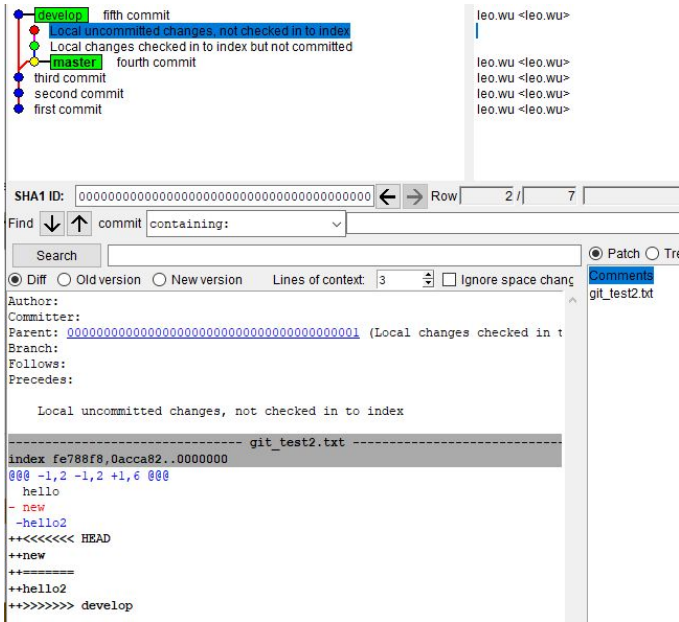


結果自動合併失敗

合併有衝突, 所以失敗了

```
$ git merge develop
Auto-merging git_test2.txt
CONFLICT (content): Merge conflict in git_test2.txt
Automatic merge failed; fix conflicts and then commit the result.
```

利用gitk來看看為甚麼失敗



master

Develop

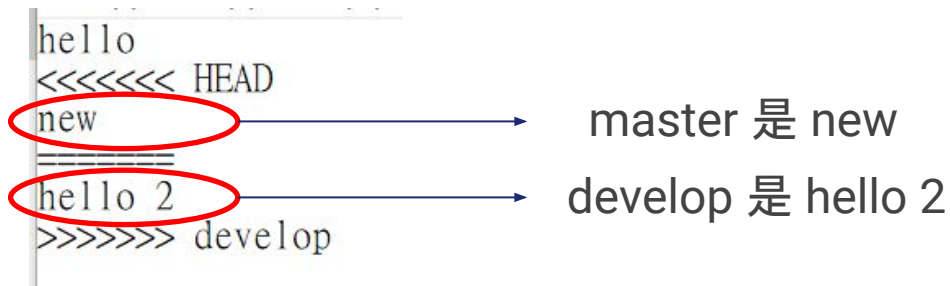
hello
new

hello
hello2

Hello後面到底是new還是hello2

合併衝突

Git 很貼心地告訴你哪裡衝突



HEAD = 現在的位置 = master

手動修改衝突

我們人工修改衝突

 git_test2.txt - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明
hello
new
hello 2

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master|MERGING)
$ git status
On branch master
You have unmerged paths.
  (fix conflicts and run "git commit")
  (use "git merge --abort" to abort the merge)

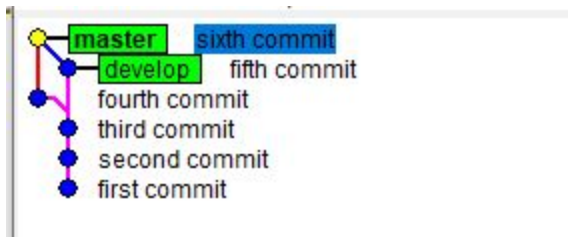
Unmerged paths:
  (use "git add <file>..." to mark resolution)
    both modified:   git_test2.txt

no changes added to commit (use "git add" and/or "git commit -a")

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master|MERGING)
$ git add .
gi
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master|MERGING)
$ git commit -m 'sixth commit'
[master 3753fd7] sixth commit
```


手動修改衝突之後

Six commit 成功了!



什麼樣的情況之下, git 會自動合併?

Git 可以自動合併的條件 - 1

不同檔案修改

master

Develop



First.txt



Second.txt



First.txt



Second.txt

猜猜看自動合併會變成怎樣？

Git 可以自動合併的條件 - 1

不同檔案修改

自動合併

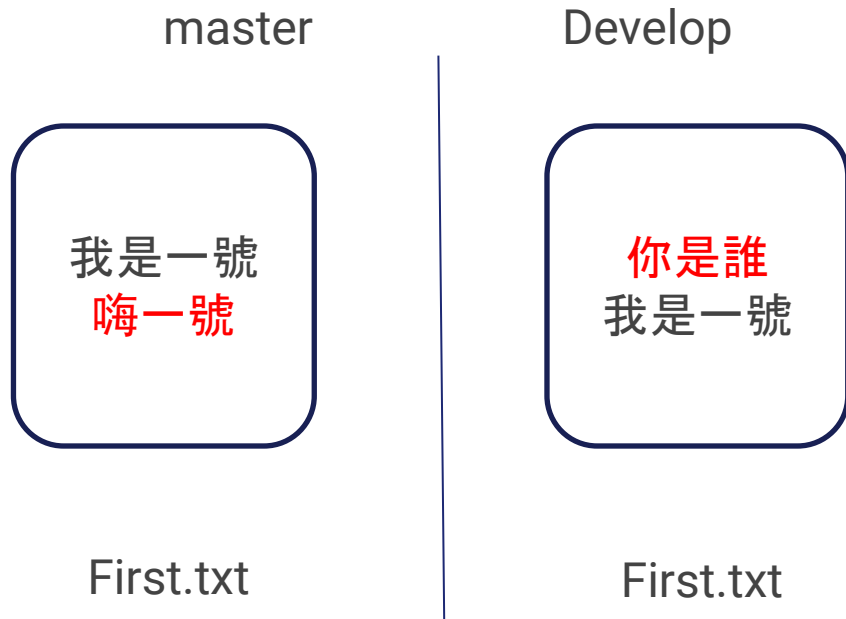
我是一號
嗨一號

我是二號
嗨二號

還滿合理的

Git 可以自動合併的條件 - 2

同檔案不同位置修改



Git 可以自動合併的條件 - 2

同檔案不同位置修改

自動合併

你是誰
我是一號
嗨一號

不用再人工合併程式

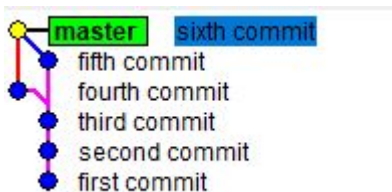
非常好用!

Git 分支刪除

最後，將不用的分支刪除

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git branch -d develop
Deleted branch develop (was ace0734).

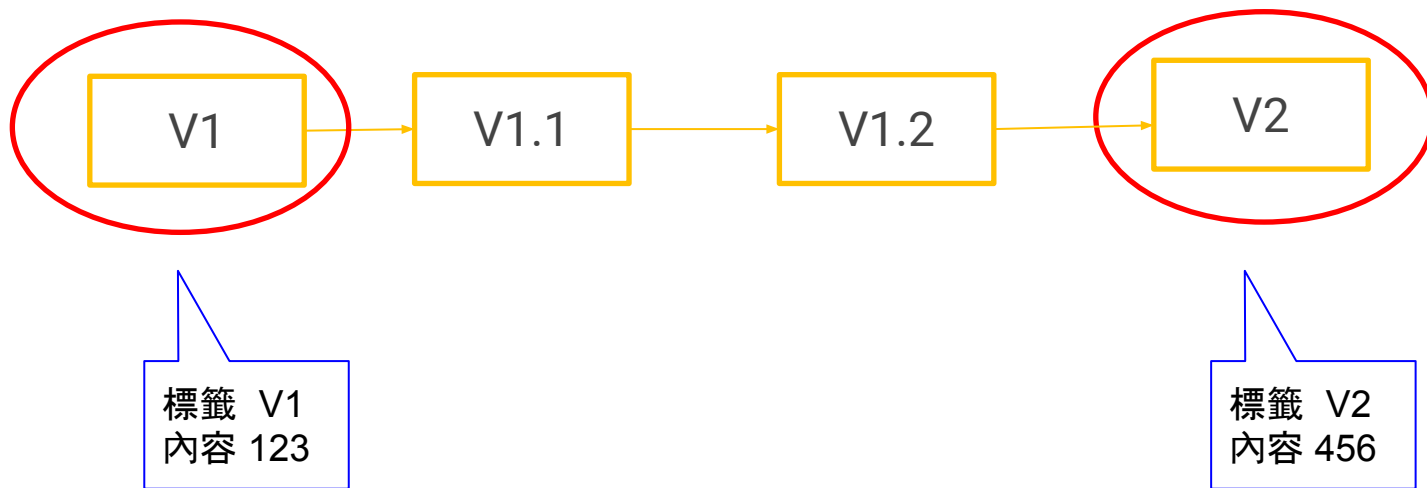
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git branch
* master
```



Develop的分支被刪除了

Git標籤

如果要發行版本，可以在特定的版本放上標籤，方便快速搜尋



標籤好用的地方

因為標籤是版號的別名

所以可以搭配reset -hard使用

git tag -> 看資訊

git reset -hard <tag_name> -> 切換到此版本

```
$ git reset --hard annotated-tag  
HEAD is now at 3753fd7 sixth commit
```



不用再輸入複雜的版號

輕量標籤 VS 標示標籤

輕量標籤
(lightweight tag)

一個commit的別名
資訊少
較少用

標示標籤
(annotated tag)

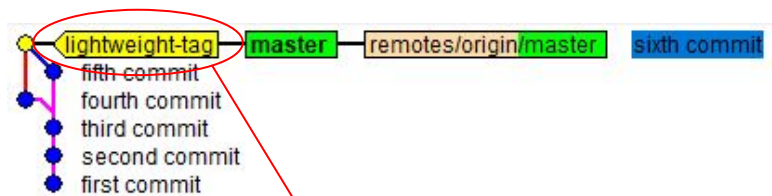
一個正式的標籤
資訊多
較常用

輕量標籤

加入輕量標籤

`git tag <tag_name>`

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)  
$ git tag lightweight-tag
```



多了一個標籤

看標籤狀態

git tag -> 看所有的標籤(包含輕量標籤跟標示標籤)

git tag -n ->看所有的標籤和敘述(包含輕量標籤跟標示標籤)

```
$ git tag
lightweight-tag

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git tag -n
lightweight-tag sixth commit
```

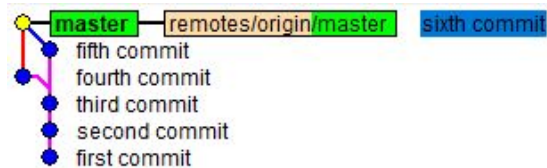
輕量標籤的狀態是commit的敘述

刪除標籤

刪除特定標籤

`git tag -d <tag_name>`

```
$ git tag -d lightweight-tag  
Deleted tag 'lightweight-tag' (was 3753fd7)
```



標示標籤

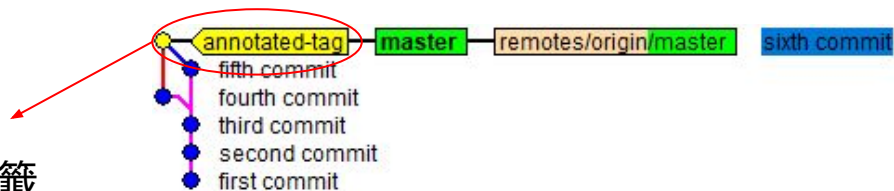
新增標示標籤

`git tag -a <tag_name> -m <tag_description>`

```
user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git tag -a annotated-tag -m 'this is annotated tag'
```

`git push origin --tags`

一樣多了一個標籤



看標籤狀態

git tag -> 看所有的標籤(包含輕量標籤跟標示標籤)

git tag -n ->看所有的標籤和敘述(包含輕量標籤跟標示標籤)

```
$ git tag
annotated-tag

user@DESKTOP-RUQ03RE MINGW64 /d/git_test (master)
$ git tag -n
annotated-tag this is annotated tag
```

標示標籤是標示時候的敘述

經驗分享

沒有使用Git:

星期三下午之前 -> 大家給小組長code, 星期三下午小組長合程式
星期四上午 -> 小組長給經理code, 經理用一天合大家的程式

用了Git: 大家再也不用合程式, 多的時間可以放空休息做更多事

下集預告

章魚貓是甚麼？

如何下載好用的code？



我要如何證明我很強？

答案都在下一堂課
Github

補充 Git 誰做了甚麼？

到底這一行是誰寫的

```
$ git blame git_test.txt
e5d9ca37 (leo.wu 2022-02-18 15:53:04 +0800 1) this is test
e5d9ca37 (leo.wu 2022-02-18 15:53:04 +0800 2) hope this test goes well
```

git blame
非常好用!

補充 Git Flow

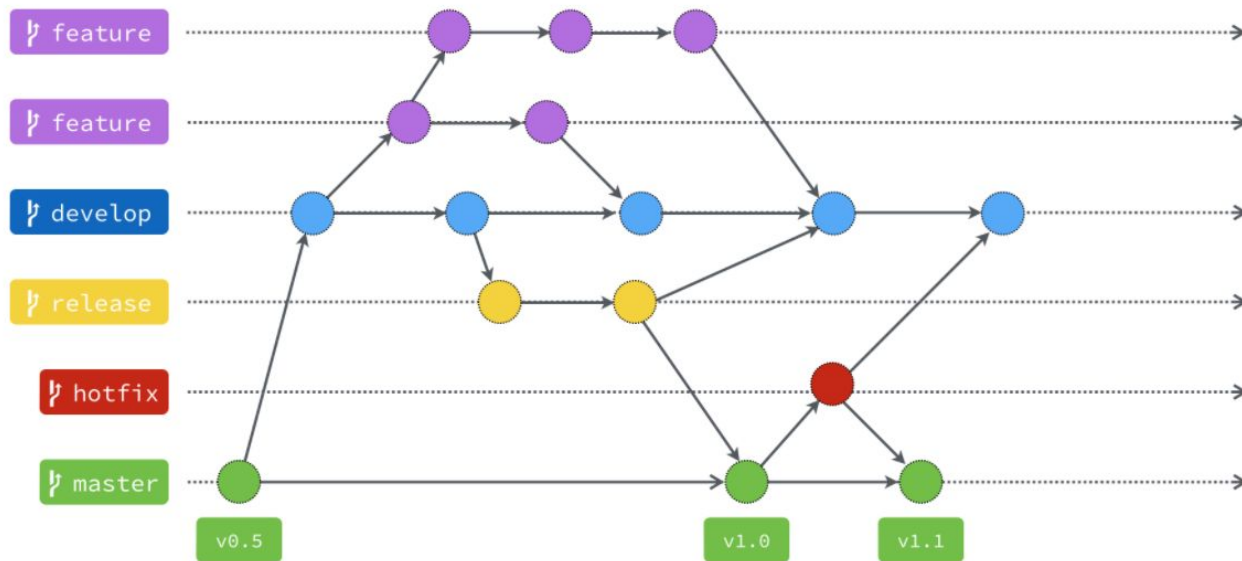
新的東西要開發

暫時版本

發版前的最後測試

突然有bug要改

發行的版本



舉例 Git Flow

補充 比較程式軟體

以前還沒有Git的時候，會用比程式軟體來看程式的差別

```
#install Openscad python
RUN pip3 install solidpython
RUN pip3 install viewscad

#install google test and google mock
RUN apt install libgtest-dev -y
RUN cd /usr/src/googletest/googletest && cmake CMakeLists.txt && make
RUN cd /usr/src/googletest/googletest && make CMakeLists.txt && make
RUN cp /usr/src/googletest/googletest/lib/libgtest.a /usr/lib
RUN cp /usr/src/googletest/googletest/lib/libgtest_main.a /usr/lib
RUN cp /usr/src/googletest/googletest/lib/libgmock_main.a /usr/lib
RUN cp /usr/src/googletest/googletest/lib/libgmock.a /usr/lib

#install install yaml
RUN echo "y" | apt-get install libyaml-cpp-dev

#install lib modbus
RUN mkdir /root/modbus_lib
COPY libmodbus-3.1.6.tar.gz /root/modbus_lib
RUN cd /root/modbus_lib && tar -zxvf libmodbus-3.1.6.tar.gz && cd ./libmodbus-3.1.6 && ./configure

#install voice
# RUN echo "y" | apt install sox
# RUN echo "y" | apt-get install libsox-fmt-mp3
COPY libxml_lib.so /usr/local/lib/libxml_lib.so

#install Openscad
RUN add-apt-repository ppa:openscad/releases
RUN apt-get update
RUN echo "y" | apt-get install openscad

#install Openscad python
RUN pip3 install solidpython
RUN pip3 install viewscad

#install google test and google mock
RUN apt install libgtest-dev -y
RUN cd /usr/src/googletest/googletest && cmake CMakeLists.txt && make
RUN cd /usr/src/googletest/googletest && make CMakeLists.txt && make
RUN cp /usr/src/googletest/googletest/lib/libgtest.a /usr/lib
RUN cp /usr/src/googletest/googletest/lib/libgtest_main.a /usr/lib
RUN cp /usr/src/googletest/googletest/lib/libgmock_main.a /usr/lib
RUN cp /usr/src/googletest/googletest/lib/libgmock.a /usr/lib

RUN echo "y" | apt-get install libyaml-cpp-dev
RUN apt-get update
RUN echo "y" | apt install ros-dashing-rqt*

RUN mkdir /root/modbus_lib
COPY libmodbus-3.1.6.tar.gz /root/modbus_lib
RUN cd /root/modbus_lib && tar -zxvf libmodbus-3.1.6.tar.gz && cd ./libmodbus-
RUN apt install sox
RUN apt-get install libsox-fmt-mp3
```

