

哈尔滨工业大学计算机科学与技术学院
2023 年秋季学期《开源软件开发实践》

Lab 1: Git 实战

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[文档全部完成之后，请更新上述区域]

1 实验要求

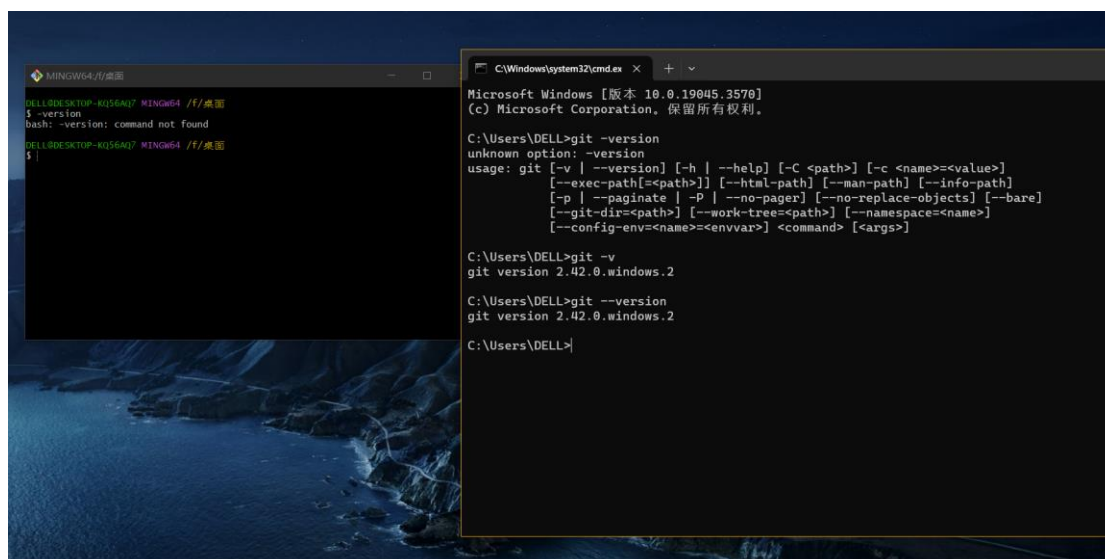
熟练掌握 git 的基本指令和分支管理指令；

掌握 git 支持软件配置管理的核心机理；

在实践项目中使用 git/github 管理自己的项目源代码

2 安装 Gitx

2.1 本地机器上安装 git



The image shows two overlapping terminal windows. The background window is a MINGW64 terminal with a dark blue background and a landscape image. It shows the command `$ version` being executed, resulting in the error `bash: -version: command not found`. The foreground window is a Windows command prompt titled `C:\Windows\system32\cmd.exe`. It shows the command `git -version` being executed, which results in an error: `unknown option: -version`. The user then enters `git -v`, which successfully displays `git version 2.42.0.windows.2`. Finally, the user enters `git --version`, which also displays `git version 2.42.0.windows.2`.

```
MINGW64 /?桌面
DELLDESKTOP-KQ56AQ7 MINGW64 /?桌面
$ version
bash: -version: command not found
DELLDESKTOP-KQ56AQ7 MINGW64 /?桌面
$

C:\Windows\system32\cmd.exe
Microsoft Windows [版本 10.0.19045.3570]
(c) Microsoft Corporation. 保留所有权利。

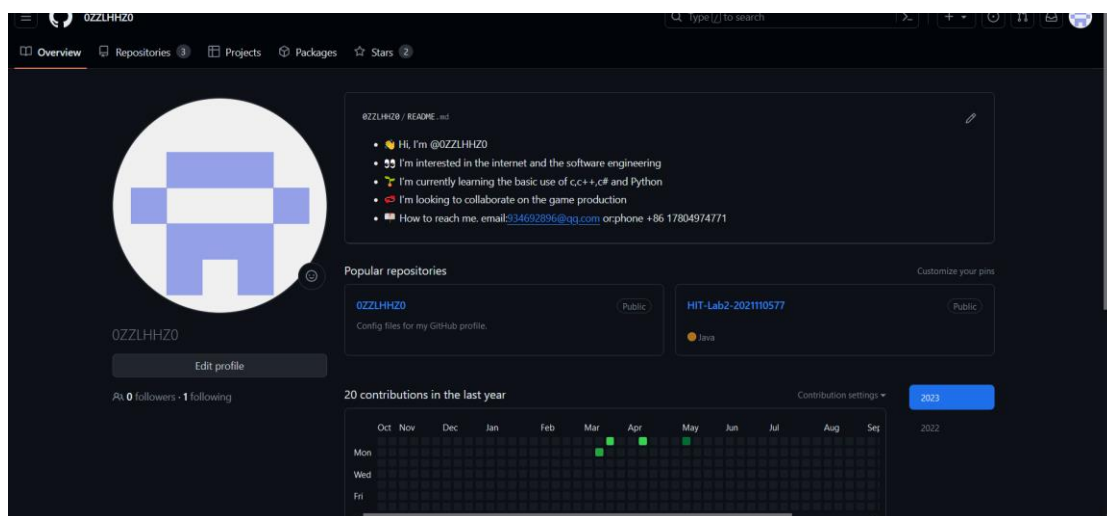
C:\Users\DELL>git -version
unknown option: -version
usage: git [-v | --version] [-h | --help] [-C <path>] [-c <name>=<value>]
[--exec-path=<path>] [--html-path] [--man-path] [--info-path]
[-p | --paginate | -P | --no-pager] [--no-replace-objects] [--bare]
[--git-dir=<path>] [--work-tree=<path>] [--namespace=<name>]
[--config-env=<name>=<envvar>] <command> [<args>]

C:\Users\DELL>git -v
git version 2.42.0.windows.2

C:\Users\DELL>git --version
git version 2.42.0.windows.2

C:\Users\DELL>
```

2.2 申请 github 帐号



3 Git 操作过程

3.1 实验场景(1): 仓库创建与提交

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git status
On branch master
Your branch is up to date with 'origin/master'.

nothing to commit, working tree clean
```

图表 1 查看仓库状态

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git init
Reinitialized existing Git repository in F:/桌面/lab1/.git/
```

图表 2 之前的未截图 已加入 git 管理

```

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git pull
Already up to date.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git add .

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git commit -m 'change 2'
On branch master
Your branch is ahead of 'origin/master' by 2 commits.
(use "git push" to publish your local commits)

nothing to commit, working tree clean

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git push origin master
fatal: 'origin' does not appear to be a git repository
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git push -u origin master
Enumerating objects: 10, done.
Counting objects: 100% (9/9), done.
Delta compression using up to 16 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (6/6), 558 bytes | 558.00 KiB/s, done.
Total 6 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 1 local object.
To github.com:OZZLHHZ0/Lab1-2021110577.git
   d16fb5a..baf8ed3  master -> master
branch 'master' set up to track 'origin/master'.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ |

```

图表 3 进行第二次 commit

```

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git pull
Already up to date.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git add .

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git commit -m 'change 3'
[master d47048c] change 3
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 src/change 3

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git push -u origin master
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 16 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 323 bytes | 323.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To github.com:OZZLHHZ0/Lab1-2021110577.git
   baf8ed3..d47048c  master -> master
branch 'master' set up to track 'origin/master'.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$

```

图表 4 第三次 commit

```

$ git log -p -1
commit d47048c2dca95332f8223754dc2a1b62432ddfd8 (HEAD -> master, origin/master)
Author: OZZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:09:00 2023 +0800

    change 3

diff --git a/src/change 3 b/src/change 3
new file mode 100644
index 0000000..e69de29

```

图表 5 查看最近一次

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git pull
Already up to date.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git add .

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git commit -m '修改后提交R4 motion'
[master 03afb2] 修改后提交R4 motion
2 files changed, 172 insertions(+)

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git push -u origin master
fatal: 'origin' does not appear to be a git repository
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git push -u origin master
Enumerating objects: 9, done.
Counting objects: 100% (8/8), done.
Delta compression using up to 16 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (5/5), 834 bytes | 834.00 KiB/s, done.
Total 5 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 1 local object.
To github.com:OZZLHHZ0/Lab1-2021110577.git
d47048c..03afb2 master -> master
branch 'master' set up to track 'origin/master'.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ |
```

图表 6 R4 修改后提交

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git pull
Already up to date.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git add .

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git commit -m 'change for delete'
[master 5403c69] change for delete
1 file changed, 1 insertion(+)
create mode 100644 src/change for delete

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git push -u origin master
Enumerating objects: 6, done.
Counting objects: 100% (6/6), done.
Delta compression using up to 16 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (4/4), 341 bytes | 341.00 KiB/s, done.
Total 4 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To github.com:OZZLHHZ0/Lab1-2021110577.git
03afb2..5403c69 master -> master
branch 'master' set up to track 'origin/master'.

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ |
```

图表 7 提交最后一次修改

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git reset --soft HEAD~1

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git log
commit 03afb207542893fc4a3ce7e4fd4d69c22eef814 (HEAD -> master)
Author: OZZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:37:35 2023 +0800

    修改后提交R4 motion

commit d47048c2dca95332f8223754dc2a1b62432ddfd8
Author: OZZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:09:00 2023 +0800

    change 3

commit baf8ed3ac0ba27eedcc1245775080ae5c3a2920e
Merge: 2a1ecc2 d16fb5a
Author: OZZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:05:23 2023 +0800

    Merge branch 'master' of github.com:OZZLHHZ0/Lab1-2021110577

commit 2a1ecc2dc25b5ab575a5d41f56ff4199ef62405f
Author: OZZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:05:05 2023 +0800

    change2

commit d16fb5a0a7cd0beb0f49926c155cce44d5dec6a6
Author: OZZLHHZ0 <101684654+OZZLHHZ0@users.noreply.github.com>
Date: Sat Oct 28 10:58:25 2023 +0800

    Create README.md

commit fddee15466aa07143f30a20ff68f6f0e10e263c93
Author: OZZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 10:51:56 2023 +0800

    change 1

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ |
```

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git log
commit 5403c69d/e1906262ee08bfabe72c113fdd1afba (HEAD -> master, origin/master)
Author: OZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:39:53 2023 +0800

    change for delete

commit 03afba207542893fc4a3ce7e4fd4d69c22eef814
Author: OZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:37:35 2023 +0800

    修改后提交R4 motion

commit d47048c7dca95332f8223754dc2a1b62432ddfd8
Author: OZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:09:00 2023 +0800

    change 3

commit baf8ed3ac0ba27eedcc1245775080ae5c3a2920e
Merge: 2a1ecc2 d16fb5a
Author: OZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:05:23 2023 +0800

    Merge branch 'master' of github.com:OZLHHZ0/Lab1-2021110577

commit 2a1ecc2dc25b5ab575a5d41f56ff4199ef62405f
Author: OZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 11:05:05 2023 +0800

    change2

commit d16fb5a0a7cd0beb0f49926c155cce44d5dec6a6
Author: OZLHHZ0 <101684654+OZLHHZ0@users.noreply.github.com>
Date: Sat Oct 28 10:58:25 2023 +0800

    Create README.md

commit fdce15466aa07143f30a20ff68f6f0e10e263c93
Author: OZLHHZ0 <934692896@qq.com>
Date: Sat Oct 28 10:51:56 2023 +0800

    change 1
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$
```

图表 8 删除前后历史记录对比

3.2 实验场景(2): 分支管理

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (main)
$ git branch
* main
  master

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (main)
$ git switch master
Switched to branch 'master'
A      src/change for delete
Your branch is behind 'origin/master' by 1 commit, and can be fast-forwarded.
(use "git pull" to update your local branch)

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git branch
  main
* master
```

图表 9 切换到 master

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git branch B1 master

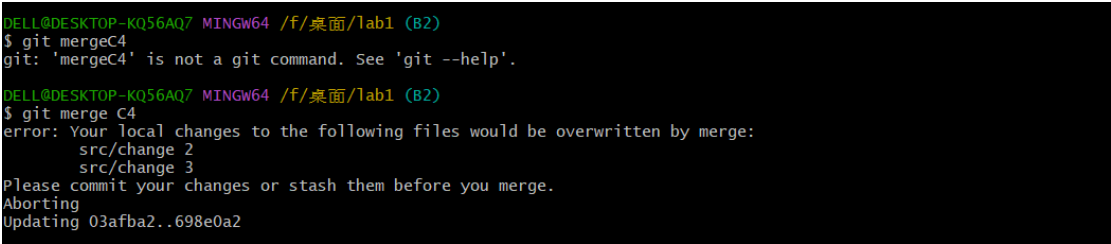
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git branch
  B1
  main
* master

DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git branch B2 master
```

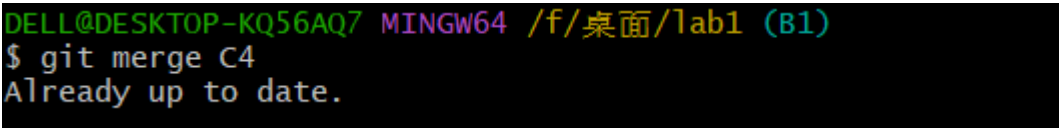
图表 10 master 基础上添加 B12

```
DELL@DESKTOP-KQ56AQ7 MINGW64 /f/桌面/lab1 (master)
$ git branch C4 B2
```

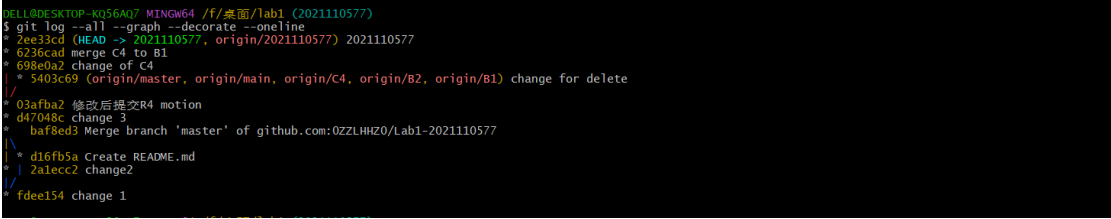
图表 11 在 B2 基础上添加 C4



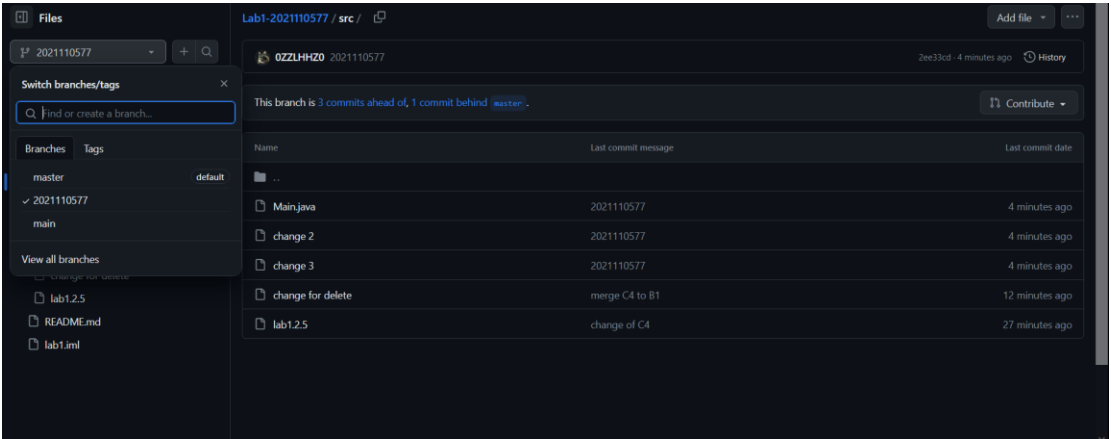
图表 12 按照规定要求 导致出现合并冲突



图表 13 成功解决冲突后合并



图表 14 查看完整变更



图表 15 web GitHub 仓库状态

3.3 实验场景(3): 在线 Git 练习

给出完成的所有任务的命令, 格式如下:

(一) 主要页面-基础篇

任务 1:

操作命令集

Git commit

任务 2:

操作命令集

Git branch bugFix

任务 3:

操作命令集

Git branch bugfix

Git checkout bugfix

Git commit

Git checkout main

Git commit

Git merge bugfix

任务 4:

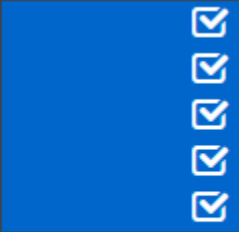
```
$ hint
先在 bugFix 分支上进行提交
$ delay 2000
$ show goal
$ git branch bugFix
$ git checkout bugFix
$ git commit
$ git checkout main
$ git commit
$ git checkout bugFix
$ git rebase main
```

(二) 主要页面-高级篇

```
使用提交记录上的标签（哈希值）来指定
$ delay 2000
$ show goal
$ git checkout c3
$ git checkout c1
$ git checkout c2
$ git checkout c0
$ git checkout c4
```

图表 16 任务 1

```
$ delay 2000
$ show goal
$ objective
$ git checkout bugFix
$ git checkout bugFix^
```



图表 17 任务 2

这一关至少要用到一次直接引用（即哈希值）

```
$ delay 2000
$ show goal
$ git branch -f bugFix HEAD~2
$ objective
$ git checkout c6
$ git branch -f main Head
```

引用 Head 不存在。


```
$ git branch -f main HEAD
$ git checkout c1
```



图表 18 任务 3

注意 revert 和 reset 使用的参数不同。

```
$ delay 2000
$ show goal
$ git checkout pushed
$ git revert HEAD
$ git checkout local
$ git reset HEAD~1
```



图表 19 任务 4

（三）主要页面-移动提交记录


```
你有两个朋友, cherry-pick 和 rebase -1  
$ delay 2000  
$ show goal  
$ git rebase -i HEAD~3  
$ git checkout main  
$ git rebase bugFix  
快速前进...
```

图表 22 任务 1

```
$ level mixed2  
$ hint  
第一个命令是 `git rebase -i HEAD~2`  
$ delay 2000  
$ show goal  
$ git revase -i HEAD~2  
The command "git revase -i HEAD~2" isn't supported, sorry!  
$ git rebase -i HEAD~2  
$ git commit --ament  
不支持选项 "--ament"  
$ git commit -ament  
不支持选项 "-ament"  
$ objective  
$ git commit --amend  
$ git rebase -i HEAD~2  
$ git branch -f main HEAD
```

图表 23 任务 2

```
$ level mixed3
$ hint

别忘记了将 main 快进到最新的更新上!

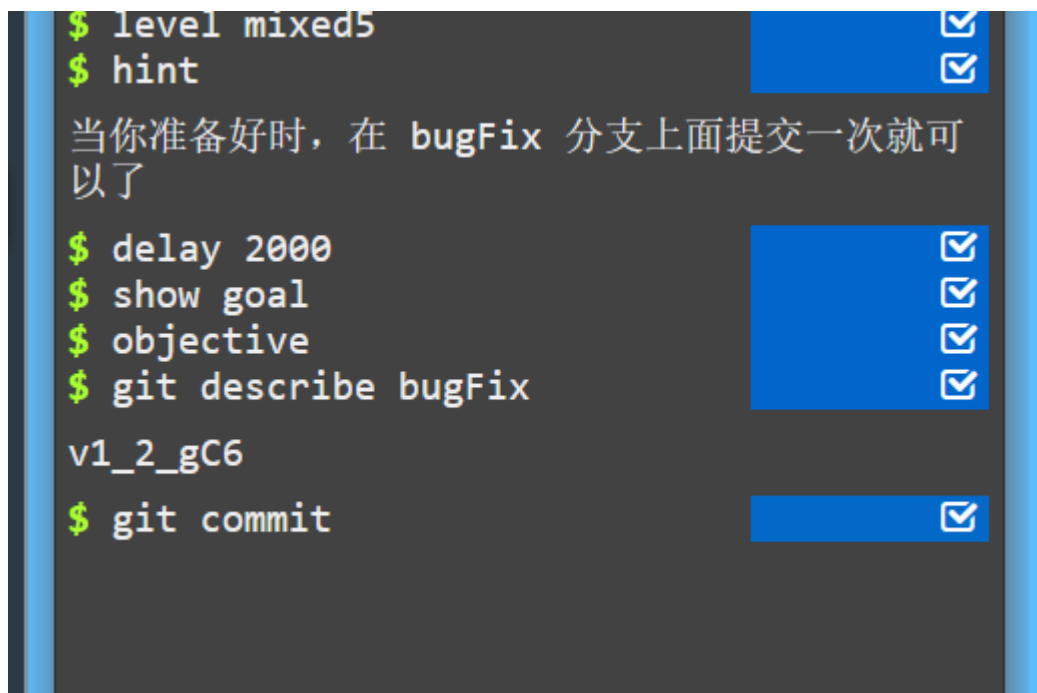
$ delay 2000
$ show goal
$ git checkout main
$ git cherry-pick c2
$ git branch -f main HEAD^
$ git cherry-pick c2'
$ git cherry-pick c3
```

图表 24 任务 3

```
你可以直接 checkout 到 commit 上，或是同样地
checkout 到 tag 上

$ delay 2000
$ show goal
$ git checkout c1
$ git tag v0
$ git checkout c2
$ git tag v1
```

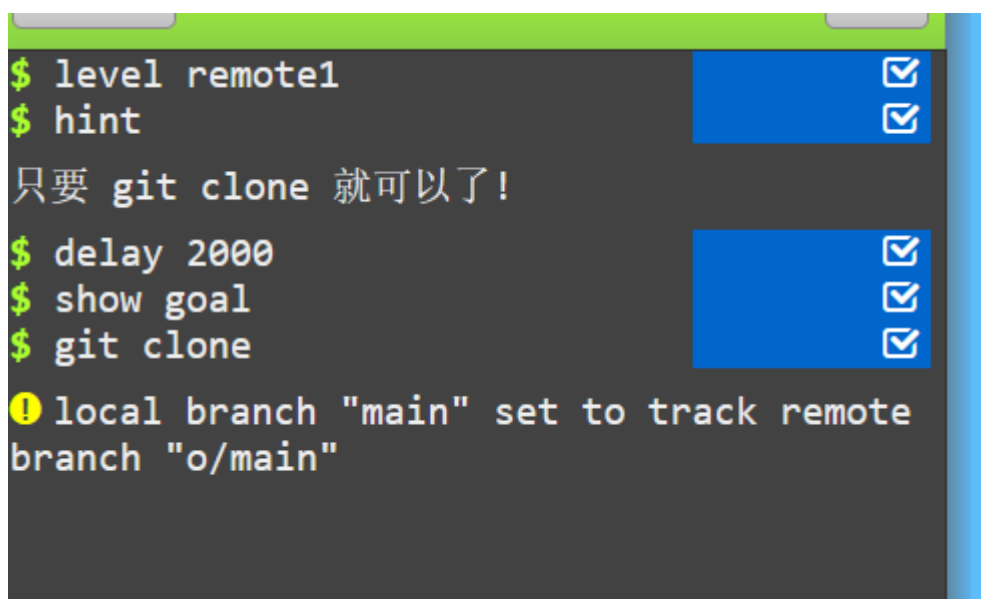
图表 25 任务 3

A terminal window with a dark background and light blue text. It shows a sequence of commands and their outputs. The commands are: \$ level mixed5, \$ hint, \$ delay 2000, \$ show goal, \$ objective, \$ git describe bugFix, v1_2_gC6, and \$ git commit. To the right of each command line is a blue rectangular box containing a white checkmark, indicating successful completion. The text "当你准备好时，在 bugFix 分支上面提交一次就可以了" is displayed between the hint and delay commands.

```
$ level mixed5
$ hint
当你准备好时，在 bugFix 分支上面提交一次就可以了
$ delay 2000
$ show goal
$ objective
$ git describe bugFix
v1_2_gC6
$ git commit
```

图表 26 任务 4

(五) 远程页面-Git 远程仓库

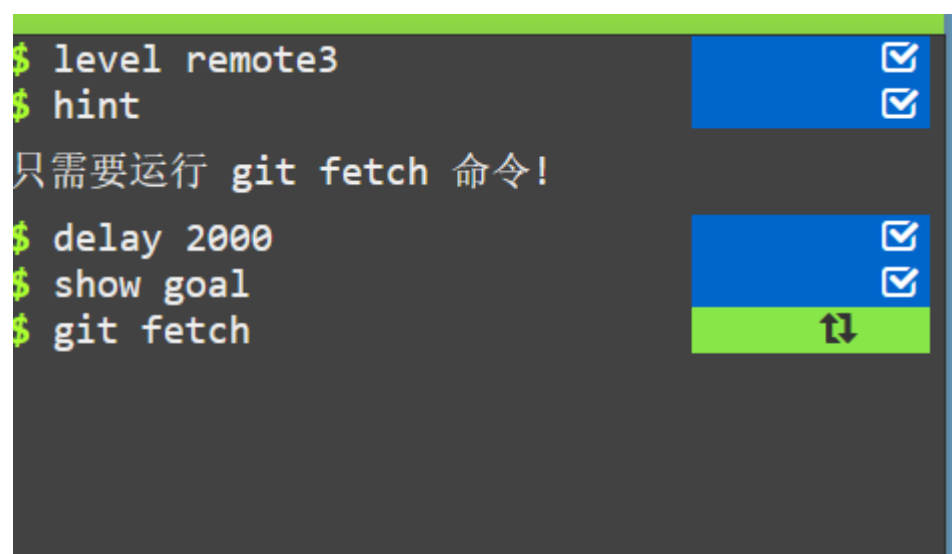
A terminal window with a dark background and light blue text. It shows a sequence of commands and their outputs. The commands are: \$ level remote1, \$ hint, \$ delay 2000, \$ show goal, and \$ git clone. To the right of each command line is a blue rectangular box containing a white checkmark, indicating successful completion. The text "只要 git clone 就可以了!" is displayed between the hint and delay commands. The output of the git clone command is: ! local branch "main" set to track remote branch "o/main".

```
$ level remote1
$ hint
只要 git clone 就可以了!
$ delay 2000
$ show goal
$ git clone
! local branch "main" set to track remote branch "o/main"
```

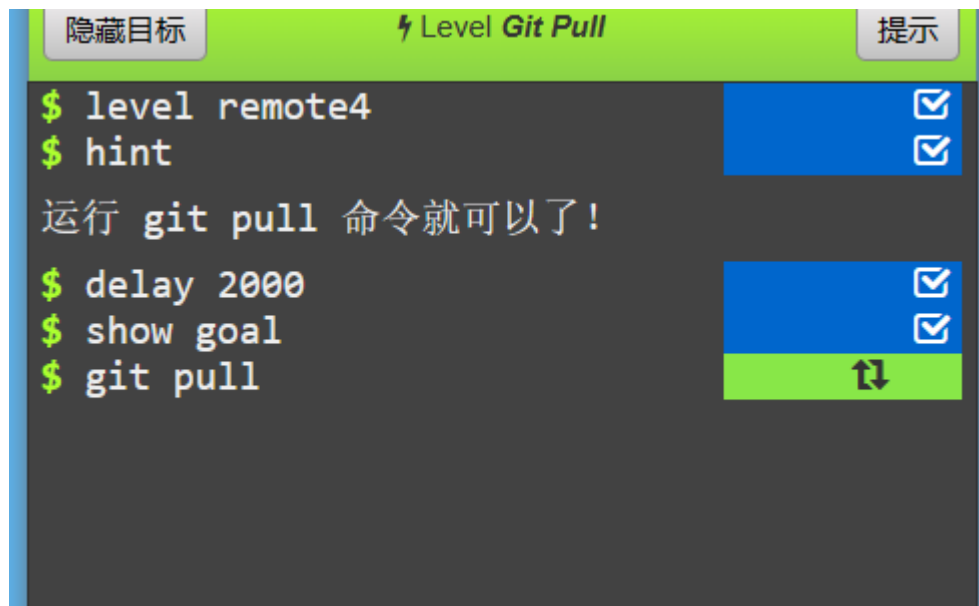
图表 27 任务 1



图表 28 任务 2



图表 29 任务 3



图表 30 任务 4


```
$ level remote5
$ hint
记住你可以指定仿真提交的个数

$ delay 2000
$ show goal
$ git fakeTeamwork foo 3
该命令需要一个 origin

$ git clone
! local branch "main" set to track remote branch "o/main"

$ git fakeTeamwork foo 2
引用 foo 不存在。

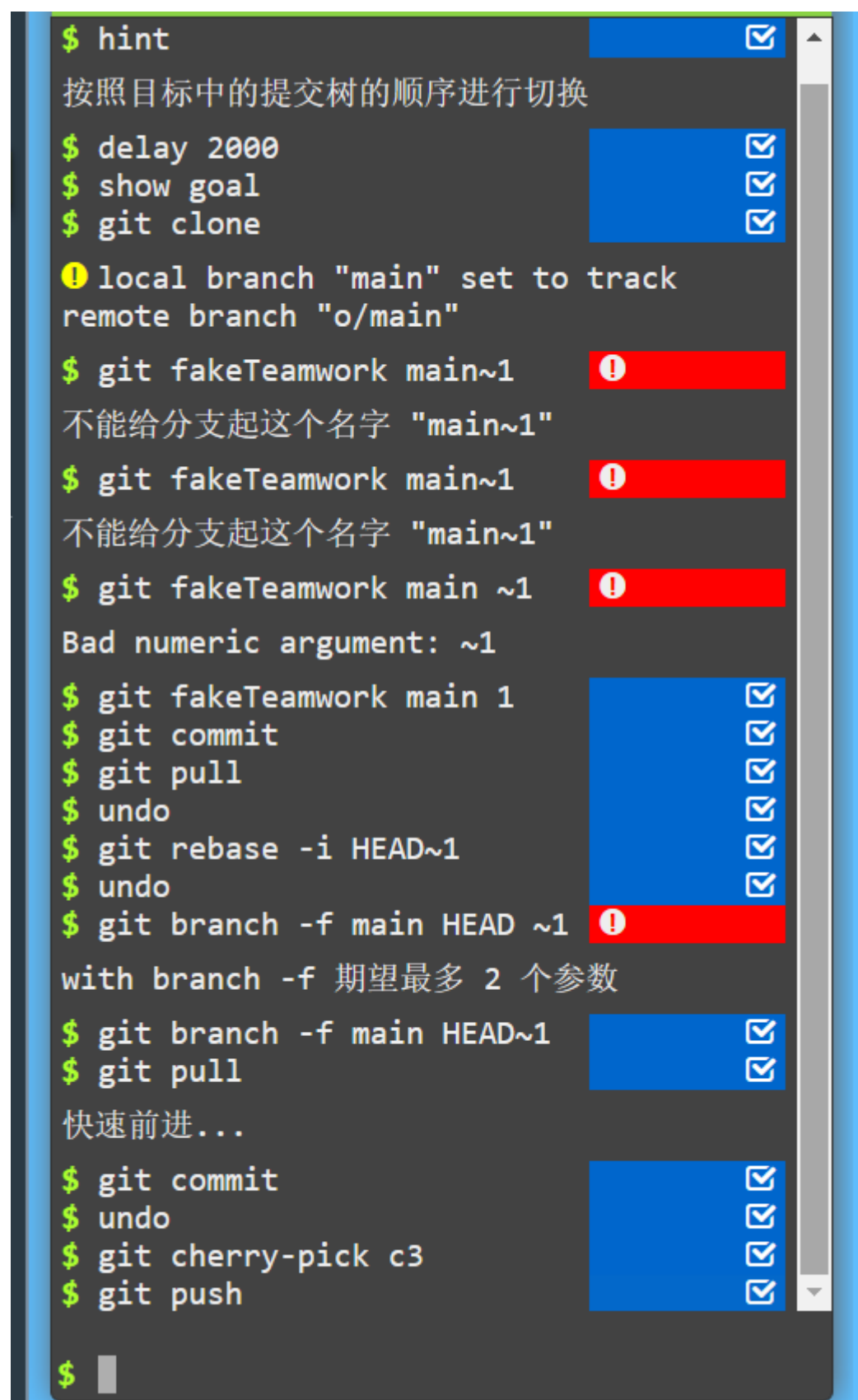
$ git fakeTeamwork foo~2
不能给分支起这个名字 "foo~2"

$ git fakeTeamwork main 2
$ git commit
$ git pull
```

图表 31 任务 5



图表 32 任务 6



```
$ hint
按照目标中的提交树的顺序进行切换

$ delay 2000
$ show goal
$ git clone

! local branch "main" set to track
remote branch "o/main"

$ git fakeTeamwork main~1
不能给分支起这个名字 "main~1"

$ git fakeTeamwork main~1
不能给分支起这个名字 "main~1"

$ git fakeTeamwork main ~1
Bad numeric argument: ~1

$ git fakeTeamwork main 1
$ git commit
$ git pull
$ undo
$ git rebase -i HEAD~1
$ undo
$ git branch -f main HEAD ~1
with branch -f 期望最多 2 个参数

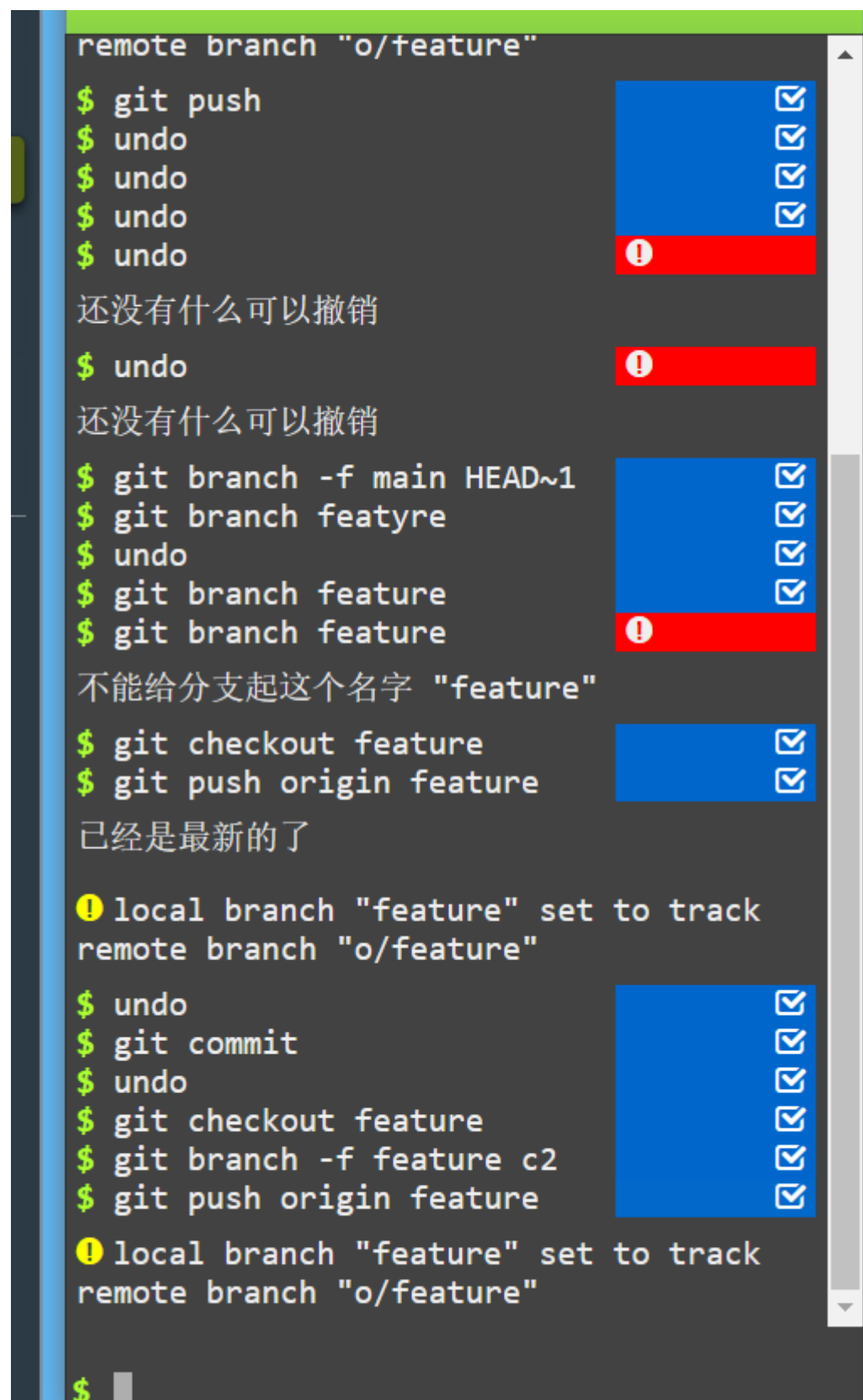
$ git branch -f main HEAD~1
$ git pull

快速前进...

$ git commit
$ undo
$ git cherry-pick c3
$ git push

$
```

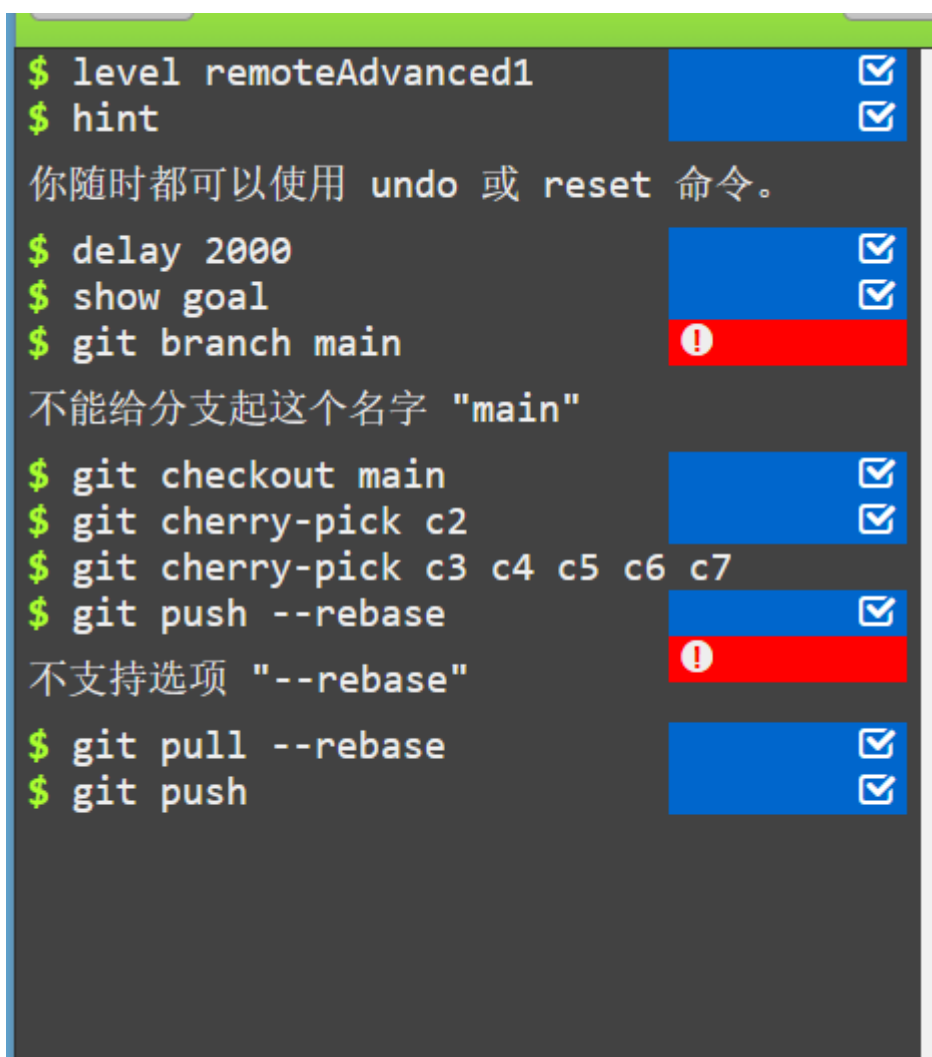
图表 33 任务 7



```
remote branch "o/feature"
$ git push
$ undo
$ undo
$ undo
$ undo
还没有什么可以撤销
$ undo
还没有什么可以撤销
$ git branch -f main HEAD~1
$ git branch featyre
$ undo
$ git branch feature
$ git branch feature
不能给分支起这个名字 "feature"
$ git checkout feature
$ git push origin feature
已经是最新的了
! local branch "feature" set to track
remote branch "o/feature"
$ undo
$ git commit
$ undo
$ git checkout feature
$ git branch -f feature c2
$ git push origin feature
! local branch "feature" set to track
remote branch "o/feature"
$
```

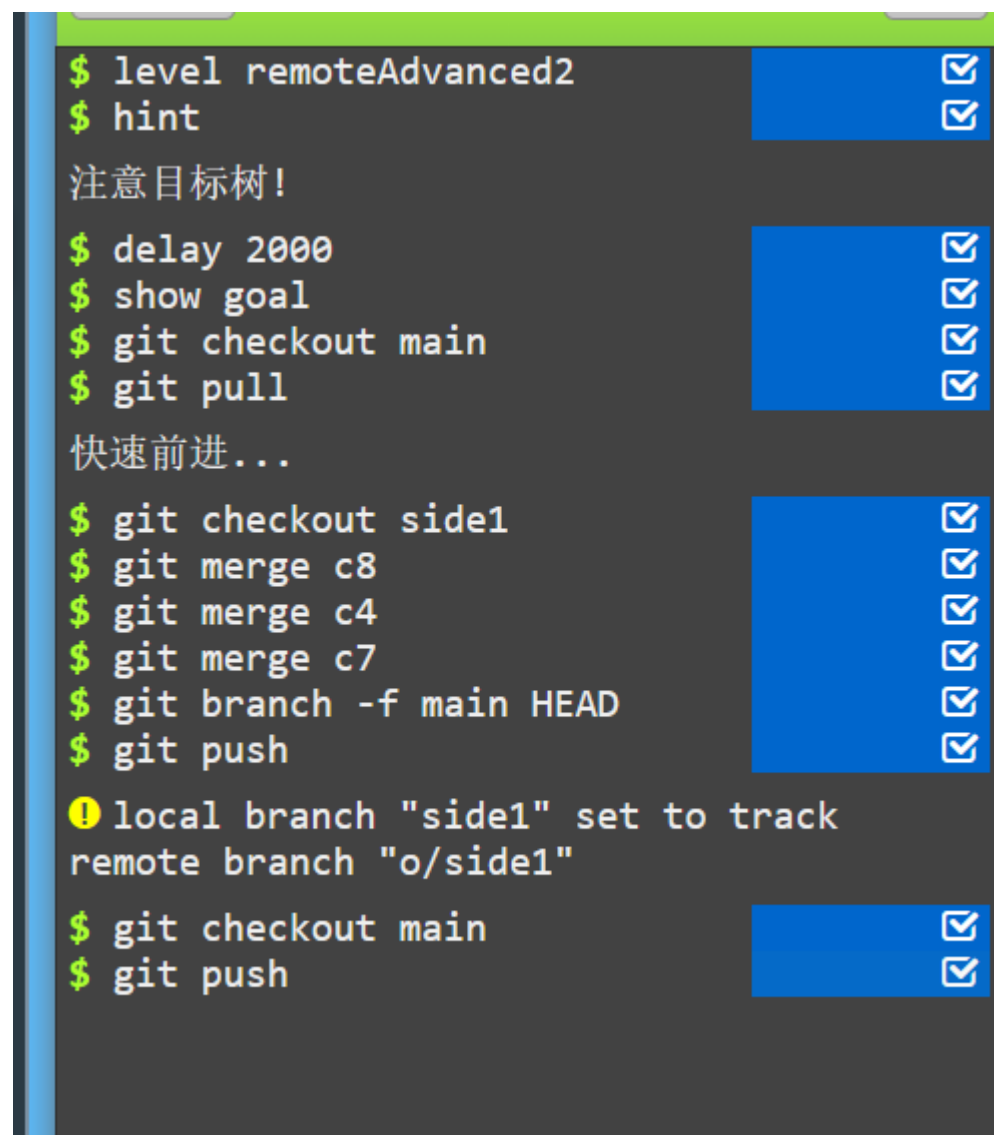
图表 34 任务 8

(六) 远程页面-Git 远程仓库高级操作



```
$ level remoteAdvanced1
$ hint
你随时都可以使用 undo 或 reset 命令。
$ delay 2000
$ show goal
$ git branch main
不能给分支起这个名字 "main"
$ git checkout main
$ git cherry-pick c2
$ git cherry-pick c3 c4 c5 c6 c7
$ git push --rebase
不支持选项 "--rebase"
$ git pull --rebase
$ git push
```

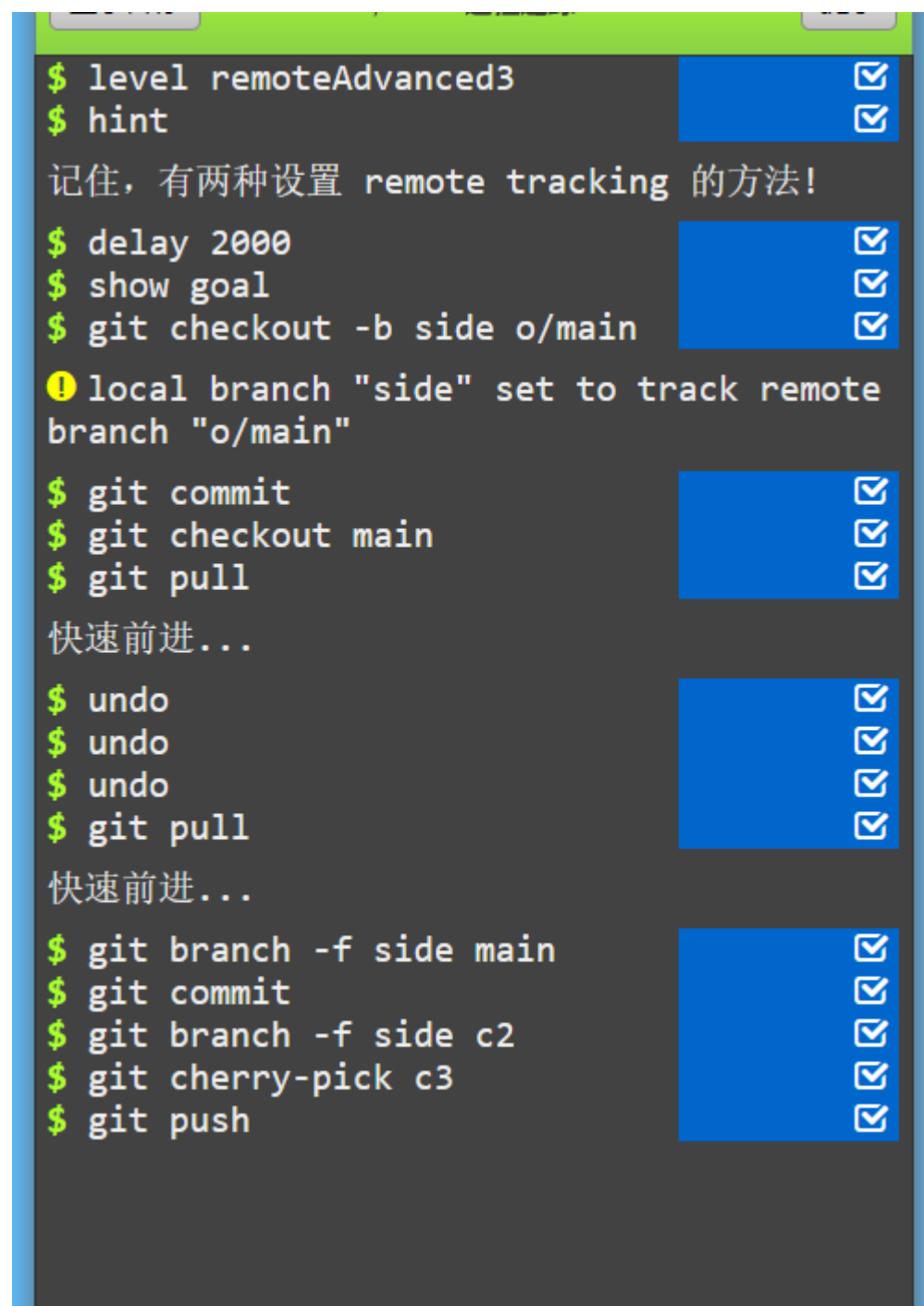
图表 35 任务 1



A terminal window with a dark background and a light blue vertical bar on the left. The terminal shows a series of Git commands and their outputs, with progress indicators (blue bars and checkmarks) on the right side of the terminal window.

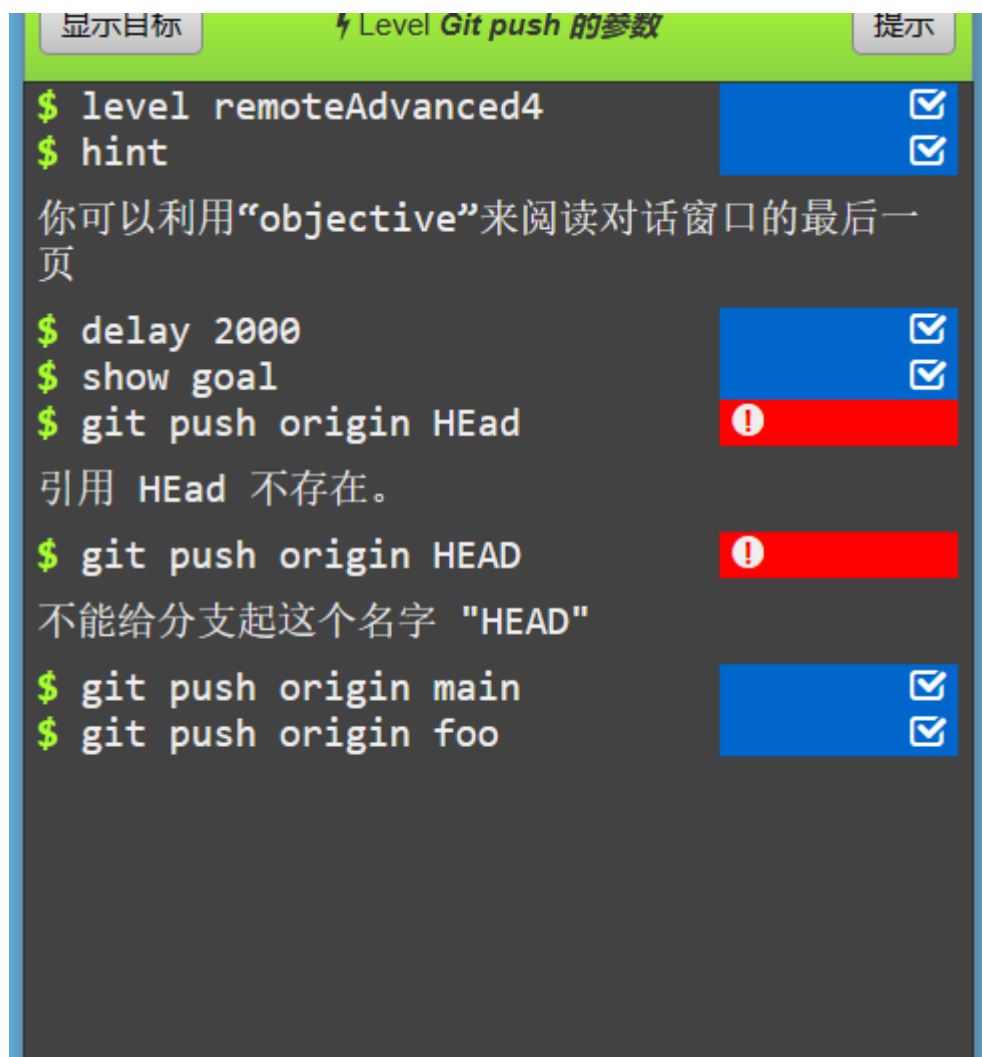
```
$ level remoteAdvanced2
$ hint
注意目标树!
$ delay 2000
$ show goal
$ git checkout main
$ git pull
快速前进...
$ git checkout side1
$ git merge c8
$ git merge c4
$ git merge c7
$ git branch -f main HEAD
$ git push
! local branch "side1" set to track
remote branch "o/side1"
$ git checkout main
$ git push
```

图表 36 任务 2



```
$ level remoteAdvanced3
$ hint
记住, 有两种设置 remote tracking 的方法!
$ delay 2000
$ show goal
$ git checkout -b side o/main
! local branch "side" set to track remote branch "o/main"
$ git commit
$ git checkout main
$ git pull
快速前进...
$ undo
$ undo
$ undo
$ git pull
快速前进...
$ git branch -f side main
$ git commit
$ git branch -f side c2
$ git cherry-pick c3
$ git push
```

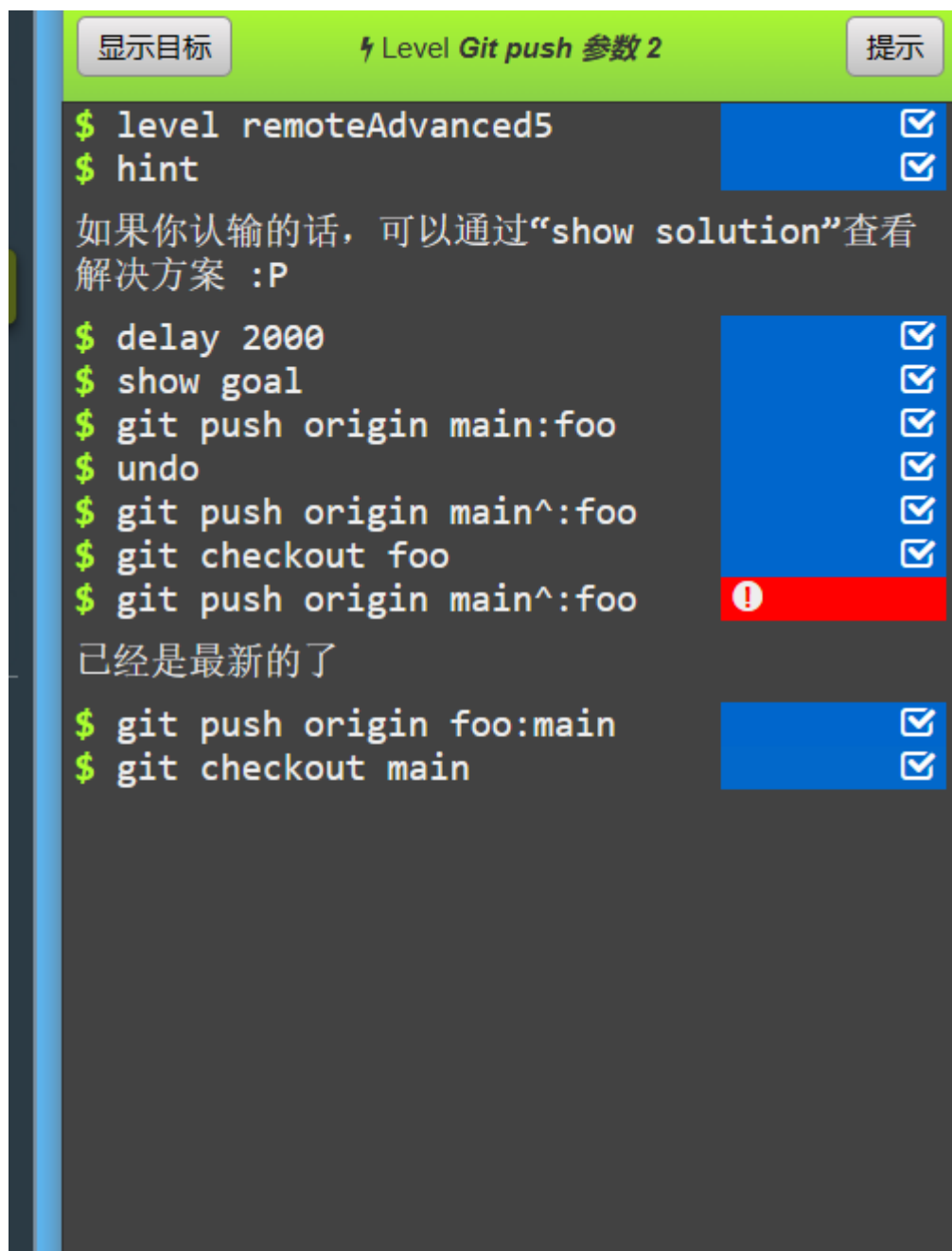
图表 37 任务 3



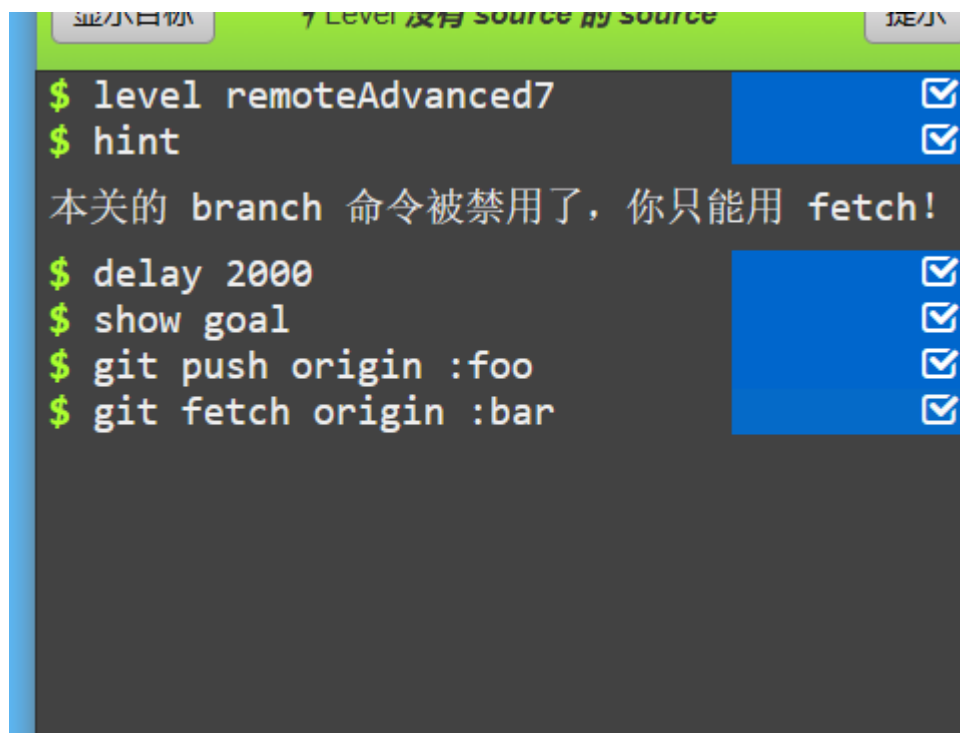
图表 38 任务 4



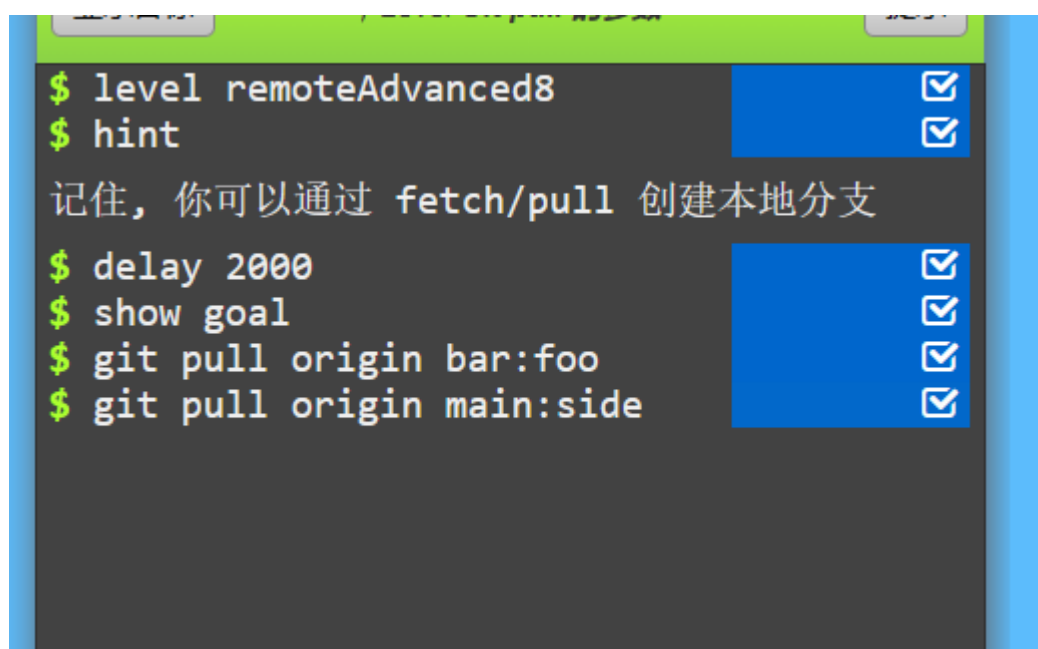
图表 39 任务 5



图表 40 任务 6



图表 41 任务 7



图表 42 任务 8

(七) 通关后的主界面截图



4 小结

对本次实验过程和结果的思考、对本次实验的收获、对本次实验的建议等。

通过本次学习，较为熟练掌握 git 的使用

建议：可以更加模拟生产环境中出现的常规操作和常见的复杂