

哈尔滨工业大学 计算学部

2024 年秋季学期 《开源软件开发实践》

Lab 1: Git 实战

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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；
使用 Git/Github 管理自己的项目源代码

2 安装 Git

2.1 本地机器上安装 git

```
rocket@worker2 ~ % git --version
git version 2.15.0
```

```
[usage: git [--version] [--help] [-C <path>] [-c name=value]
        [--exec-path[=<path>]] [--html-path] [--man-path] [--info-path]
        [-p | --paginate | --no-pager] [--no-replace-objects] [--bare]
        [--git-dir=<path>] [--work-tree=<path>] [--namespace=<name>]
        <command> [<args>]

These are common Git commands used in various situations:


start a working area (see also: git help tutorial)
    clone      Clone a repository into a new directory
    init       Create an empty Git repository or reinitialize an existing one

work on the current change (see also: git help everyday)
    add        Add file contents to the index
    mv         Move or rename a file, a directory, or a symlink
    reset      Reset current HEAD to the specified state
    rm         Remove files from the working tree and from the index

examine the history and state (see also: git help revisions)
    bisect     Use binary search to find the commit that introduced a bug
    grep       Print lines matching a pattern
    log        Show commit logs
    show       Show various types of objects
    status     Show the working tree status

grow, mark and tweak your common history
    branch     List, create, or delete branches
    checkout   Switch branches or restore working tree files
    commit     Record changes to the repository
    diff       Show changes between commits, commit and working tree, etc
    merge      Join two or more development histories together
    rebase     Reapply commits on top of another base tip
    tag        Create, list, delete or verify a tag object signed with GPG

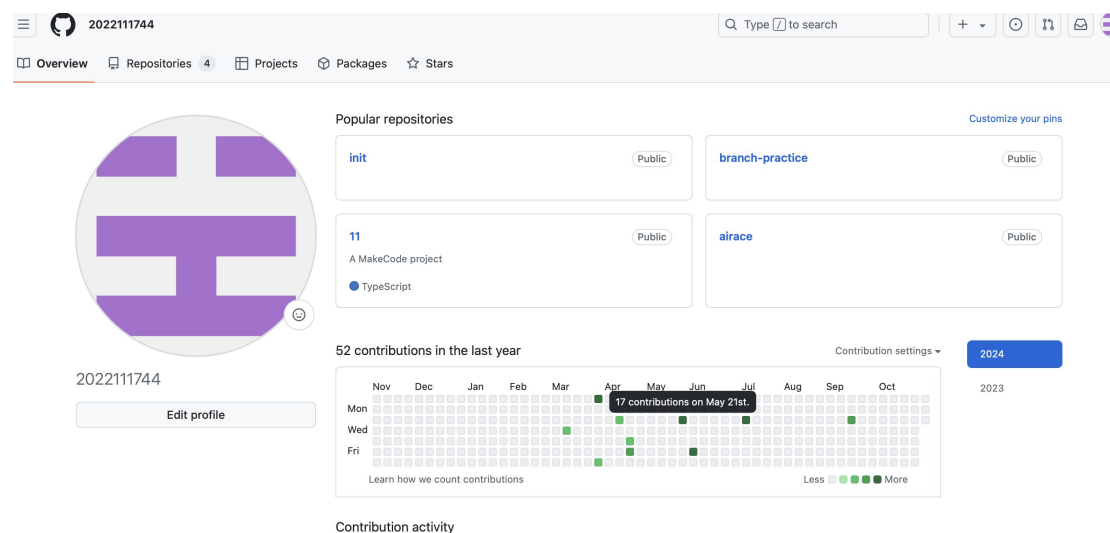
collaborate (see also: git help workflows)
    fetch      Download objects and refs from another repository
    pull       Fetch from and integrate with another repository or a local branch
    push       Update remote refs along with associated objects

'git help -a' and 'git help -g' list available subcommands and some
concept guides. See 'git help <command>' or 'git help <concept>'
to read about a specific subcommand or concept.
```

2.2 申请 github 帐号

账号名称: 2022111744

地址: <https://github.com/OSSDP/Lab1-2022111744>



3 Git 操作过程

3.1 实验场景(1): 仓库创建与提交

git status:

```
rocket@worker2 ~ % git status
On branch master
```

No commits yet

Untracked files:

(use "git add <file>..." to include in what will be committed)

```
.CFUserTextEncoding
.arduinoIDE/
.bash_profile
.cache/
.conda/
.condarc
.config/
.docker/
.gitconfig
.ipynb/
.jupyter/
.lessshst
.local/
.m2/
.matplotlib/
.pyenv/
.pyenv/
.redhat/
.siege/
.spyder-py3/
.ssh/
.swiftpm/
.vim/
.viminfo
.vnc/
.vscode/
```

1.1:

git init

```

rocket@worker2 yuanma % git init
Initialized empty Git repository in /Users/rocket/Desktop/yuanma/.git/
rocket@worker2 yuanma % git status
On branch master

No commits yet

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

        .gitignore
        .idea/
        pom.xml
        src/

nothing added to commit but untracked files present (use "git add" to track)
rocket@worker2 yuanma %

```

1.2:

git add .

git commit -m "first"

```

[rocket@worker2 yuanma % git add .
[rocket@worker2 yuanma % git commit -m "first"
[master (root-commit) 1f9cc91] first
17 files changed, 1274 insertions(+)
create mode 100644 .gitignore
create mode 100644 .idea/.name
create mode 100644 .idea/dataSources.local.xml
create mode 100644 .idea/dataSources.xml
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28.xml
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/db1.c4MBAA.meta
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/db2.dIMBAA.meta
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/db3.dYMBAA.meta
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/information_schema.FNRwLQ.meta
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/mysql.osA4Bg.meta
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/performance_schema.kIW0nw.meta
create mode 100644 .idea/dataSources/19b17189-3c03-4a45-ba43-c812191b3a28/storage_v2/_src_/schema/sys.zb4BAA.meta
create mode 100644 .idea/misc.xml
create mode 100644 .idea/workspace.xml
create mode 100644 pom.xml
create mode 100644 src/main/java/Demo.java
create mode 100644 src/main/resources/conf.yml
[rocket@worker2 yuanma % git status
On branch master
nothing to commit, working tree clean
rocket@worker2 yuanma %

```

1.3:

git diff

```

Connection conn = dataSource.getConnection();
Statement stmt = conn.createStatement();

System.out.println(stmt.executeUpdate( sql: "insert into users(id, name) values(1, 'zhangsan')");
System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values(1, 100)"));
System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values(2, 200)"));
//first change
}
}

```

```

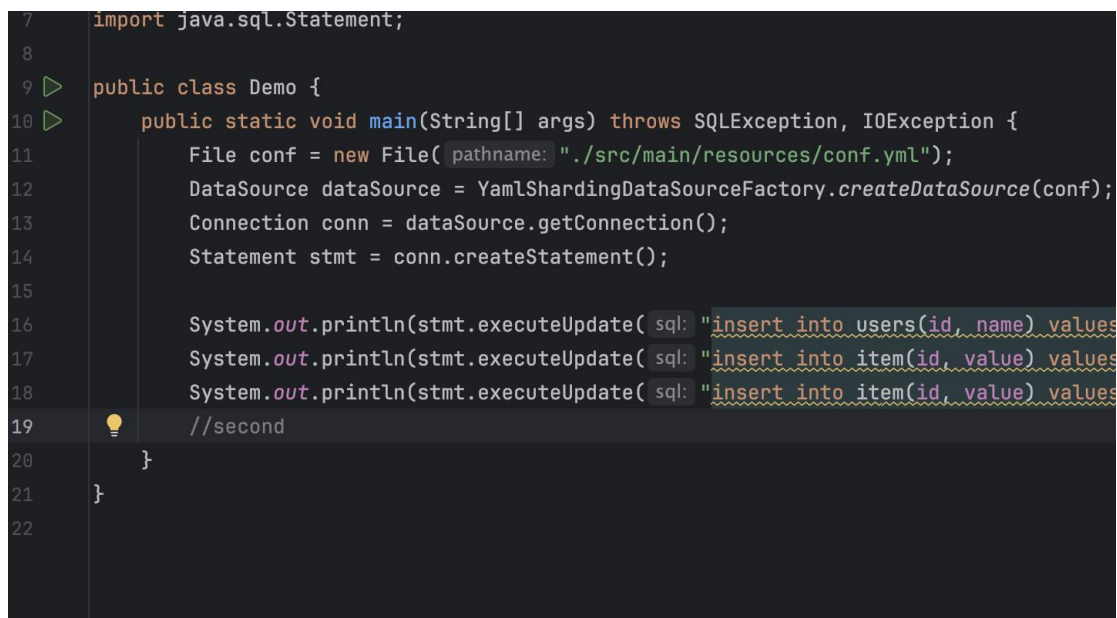
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

        modified:   .idea/workspace.xml
        modified:   src/main/java/Demo.java

```

1.4:

```
[rocket@worker2 yuanma % git commit -m "second"
[master be64a69] second
 2 files changed, 26 insertions(+), 25 deletions(-)
rocket@worker2 yuanma %
```



```
7 import java.sql.Statement;
8
9 public class Demo {
10     public static void main(String[] args) throws SQLException, IOException {
11         File conf = new File( pathname: "./src/main/resources/conf.yml");
12         DataSource dataSource = YamlShardingDataSourceFactory.createDataSource(conf);
13         Connection conn = dataSource.getConnection();
14         Statement stmt = conn.createStatement();
15
16         System.out.println(stmt.executeUpdate( sql: "insert into users(id, name) values
17         System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values
18         System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values
19         //second
20     }
21 }
22
```

1.5:

```
rocket@worker2 yuanma % git add .
rocket@worker2 yuanma % git commit -m "third"
[master 75ca29a] third
 2 files changed, 2 insertions(+), 1 deletion(-)
rocket@worker2 yuanma %
```

1.6:

```
git reset --soft HEAD~1
```

```
 2 files changed, 2 insertions(+), 1 deletion(-)
[rocket@worker2 yuanma % git reset --soft HEAD~1
rocket@worker2 yuanma %
```

1.7:

```
git log --oneline
```

符合实际

```
rocket@worker2 yuanma % git reset --soft HEAD~1
rocket@worker2 yuanma % git log --oneline
be64a69 (HEAD -> master) second
901451b first change
1f9cc91 first
```

1.8:

```
git remote set-url origin https://github.com/OSSDP/Lab1-2022111744.git
```

1.9:

```

total 49 (delta 8), reused 0 (delta 0)
remote: Resolving deltas: 100% (8/8), done.
remote:
remote: Create a pull request for 'master' on GitHub by visiting:
remote:   https://github.com/OSSDP/Lab1-2022111744/pull/new/master
remote:
to https://github.com/OSSDP/Lab1-2022111744.git
* [new branch]      master -> master
branch 'master' set up to track remote branch 'master' from 'origin'.
rocket@worker2 yuanma %

```

Default

Branch	Updated	Check status	Behind / Ahead	Pull request
main	2 hours ago		Default	

Your branches

Branch	Updated	Check status	Behind / Ahead	Pull request
master	1 minute ago		1 3	

Active branches

Branch	Updated	Check status	Behind / Ahead	Pull request
master	1 minute ago		1 3	

This branch is 3 commits ahead of, 1 commit behind main.

Contribute

2022111744 second be64a69 · 11 minutes ago 3 Commits

.idea	second	11 minutes ago
src/main	second	11 minutes ago
.gitignore	first	18 minutes ago
pom.xml	first	18 minutes ago

README

Activity

- Custom properties
- 0 stars
- 0 watching
- 0 forks

Releases

No releases published

Create a new release

Packages

No packages published

Publish your first package

实现!!!

3.2 实验场景(2): 分支管理

2.1:

```

rocket@worker2 yuanma % git branch
* master
rocket@worker2 yuanma % git checkout master
M      .idea/workspace.xml
M      src/main/java/Demo.java
Already on 'master'
Your branch is up to date with 'origin/master'.
rocket@worker2 yuanma %

```

2.2:

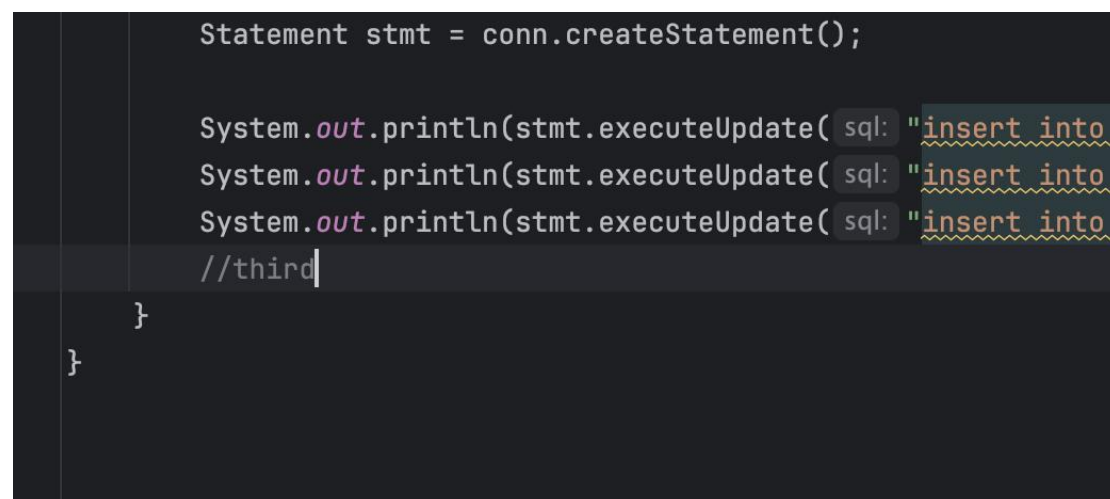
```
rocket@worker2 yuanma % git checkout -b B1
M      .idea/workspace.xml
M      src/main/java/Demo.java
Switched to a new branch 'B1'
rocket@worker2 yuanma % git checkout master
M      .idea/workspace.xml
M      src/main/java/Demo.java
Switched to branch 'master'
Your branch is up to date with 'origin/master'.
rocket@worker2 yuanma % git checkout -b B2
M      .idea/workspace.xml
M      src/main/java/Demo.java
Switched to a new branch 'B2'
rocket@worker2 yuanma %
```

2.3:

```
rocket@worker2 yuanma % git checkout -b C4
M      .idea/workspace.xml
M      src/main/java/Demo.java
Switched to a new branch 'C4'
rocket@worker2 yuanma %
```

2.4:

修改:



```
Statement stmt = conn.createStatement();

System.out.println(stmt.executeUpdate( sql: "insert into
System.out.println(stmt.executeUpdate( sql: "insert into
System.out.println(stmt.executeUpdate( sql: "insert into
//third
}
}
```

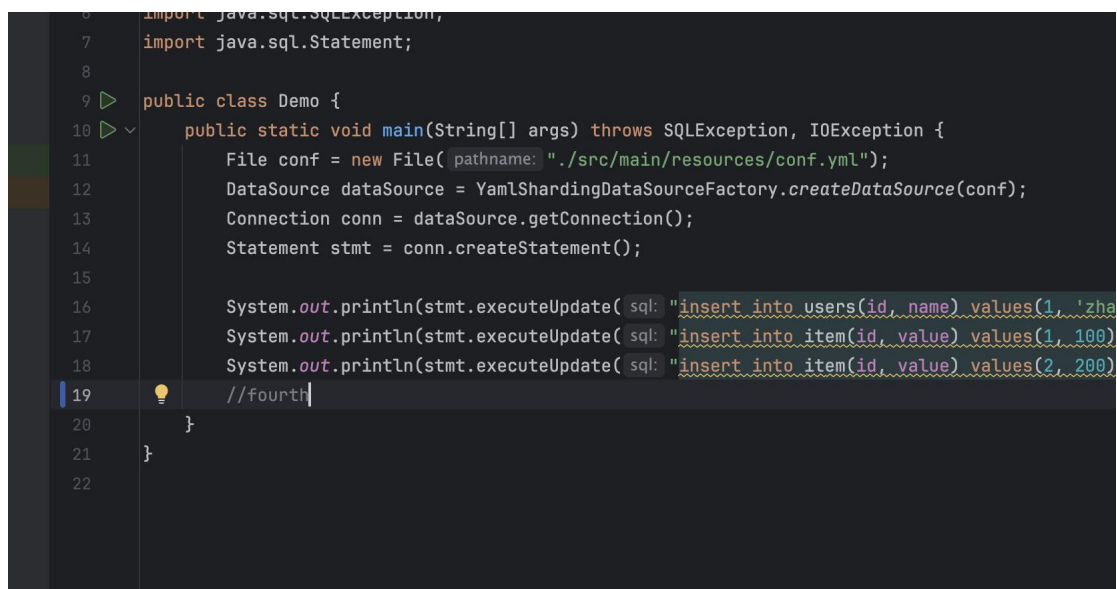
```
rocket@worker2 yuanma % git commit -m "change in c4"
[C4 86fb238] change in c4
2 files changed, 2 insertions(+), 1 deletion(-)
rocket@worker2 yuanma %
```

2.5/6:


```

rocket@worker2 yuanma % git add .
rocket@worker2 yuanma % git commit -m "change in c4"
[C4 fcf7715] change in c4
 2 files changed, 4 insertions(+), 2 deletions(-)
rocket@worker2 yuanma % git checkout B1
Switched to branch 'B1'

```



```

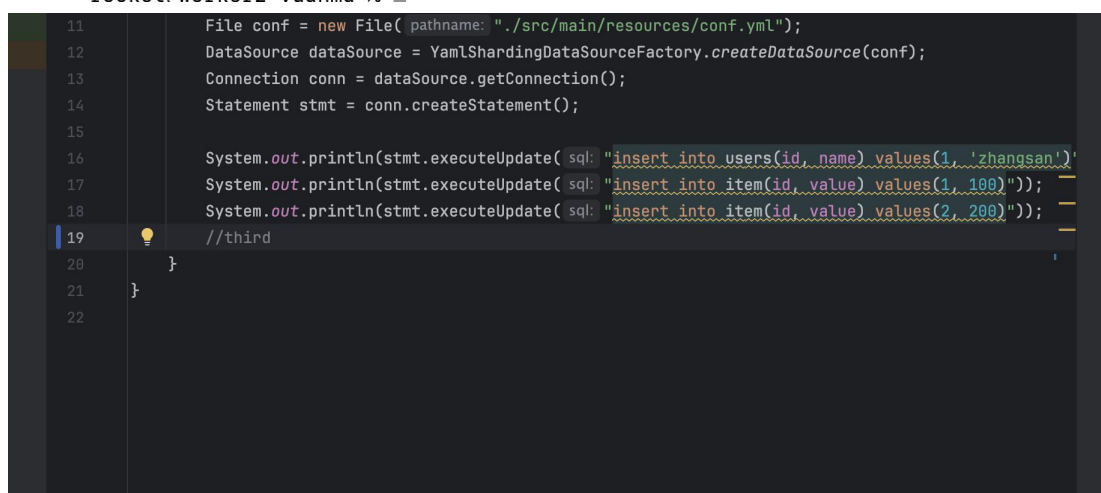
6 import java.sql.SQLException;
7 import java.sql.Statement;
8
9 public class Demo {
10     public static void main(String[] args) throws SQLException, IOException {
11         File conf = new File( pathname: "./src/main/resources/conf.yml");
12         DataSource dataSource = YamlShardingDataSourceFactory.createDataSource(conf);
13         Connection conn = dataSource.getConnection();
14         Statement stmt = conn.createStatement();
15
16         System.out.println(stmt.executeUpdate( sql: "insert into users(id, name) values(1, 'zhangsan')");
17         System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values(1, 100)");
18         System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values(2, 200)");
19         //fourth
20     }
21 }
22

```

```

rocket@worker2 yuanma % git merge C4
Updating be64a69..fcf7715
error: Your local changes to the following files would be overwritten by merge:
  .idea/workspace.xml
  src/main/java/Demo.java
Please commit your changes or stash them before you merge.
Aborting
rocket@worker2 yuanma %

```



```

11 File conf = new File( pathname: "./src/main/resources/conf.yml");
12 DataSource dataSource = YamlShardingDataSourceFactory.createDataSource(conf);
13 Connection conn = dataSource.getConnection();
14 Statement stmt = conn.createStatement();
15
16 System.out.println(stmt.executeUpdate( sql: "insert into users(id, name) values(1, 'zhangsan')");
17 System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values(1, 100)");
18 System.out.println(stmt.executeUpdate( sql: "insert into item(id, value) values(2, 200)");
19 //third
20 }
21 }
22

```

```

rocket@worker2 yuanma % git merge C4
Updating be64a69..fcf7715
Fast-forward
 .idea/workspace.xml      | 5 ++++-
 src/main/java/Demo.java | 2 +-
 2 files changed, 5 insertions(+), 2 deletions(-)
rocket@worker2 yuanma %

```

合并成功:

2.7:

```

4      Statement stmt = conn.createStatement();
5
6      System.out.println(stmt.executeUpdate( sql: "insert into users(id,
7      System.out.println(stmt.executeUpdate( sql: "insert into item(id,
8      System.out.println(stmt.executeUpdate( sql: "insert into item(id,
9      //b2
10     }
11 }
12

```

```

rocket@worker2 yuanma % git commit -m "change in b2"
[B2 85bf4de] change in b2
 2 files changed, 26 insertions(+), 25 deletions(-)
rocket@worker2 yuanma %

```

2.8:

```

rocket@worker2 yuanma % git branch --merged
* B2
  master
rocket@worker2 yuanma % git branch --no-merged
B1
C4
rocket@worker2 yuanma %

```

2.9:

```

rocket@worker2 yuanma % git branch -d B2
error: The branch 'B2' is not fully merged.
If you are sure you want to delete it, run 'git branch -D B2'.
rocket@worker2 yuanma % git branch -D B2
Deleted branch B2 (was 85bf4de).
rocket@worker2 yuanma %

rocket@worker2 yuanma % git branch -d master
Deleted branch master (was be64a69)
rocket@worker2 yuanma % git checkout -b 2022111744
Switched to a new branch '2022111744'
rocket@worker2 yuanma % git merge C4
Already up to date.

```

2.10:

```
rocket@worker2 yuanma % git branch
* 2022111744
  B1
  C4
rocket@worker2 yuanma % git add .
rocket@worker2 yuanma % git commit -m "all new"
On branch 2022111744
nothing to commit, working tree clean
rocket@worker2 yuanma % git push -u origin 2022111744
Counting objects: 16, done.
Delta compression using up to 16 threads.
Compressing objects: 100% (12/12), done.
Writing objects: 100% (16/16), 1.26 KiB | 1.26 MiB/s, done.
Total 16 (delta 6), reused 0 (delta 0)
remote: Resolving deltas: 100% (6/6), completed with 3 local objects.
remote:
remote: Create a pull request for '2022111744' on GitHub by visiting:
remote:   https://github.com/OSSDP/Lab1-2022111744/pull/new/2022111744
remote:
To https://github.com/OSSDP/Lab1-2022111744.git
 * [new branch]      2022111744 -> 2022111744
Branch '2022111744' set up to track remote branch '2022111744' from 'origin'.
rocket@worker2 yuanma %
```




2.11:







```
* 96db955 (refs/stash) WIP on B1: be64a69 second
| \
| * 7e12693 index on B1: be64a69 second
| /
| * fcf7715 (HEAD -> 2022111744, origin/2022111744, C4, B1) change in c4
| * 86fb238 change in c4
| /
* be64a69 (origin/master) second
* 901451b first change
* 1f9cc91 first
```







2.12:

 .idea	change in c4	12 minutes ago	No Cre
 src/main	change in c4	12 minutes ago	Pa
 .gitignore	first	38 minutes ago	No
 pom.xml	first	38 minutes ago	Put

 README

Overview					
Branch	Updated	Check status	Behind	Ahead	Pull request
main 	 2 hours ago			Default	 ...

Your branches					
Branch	Updated	Check status	Behind	Ahead	Pull request
2022111744 	 1 minute ago		1	5	 ...
master 	 21 minutes ago		1	3	 ...

Active branches					
Branch	Updated	Check status	Behind	Ahead	Pull request
2022111744 	 1 minute ago		1	5	 ...
master 	 21 minutes ago		1	3	 ...

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:

\$ git commit	<input checked="" type="checkbox"/>
\$ git commit	<input checked="" type="checkbox"/>

任务 2:

\$ git branch bugFix	<input checked="" type="checkbox"/>
\$ git checkout bugFix	<input checked="" type="checkbox"/>

任务 3:

git checkout -b bugFix	<input checked="" type="checkbox"/>
git commit	<input checked="" type="checkbox"/>
git checkout main	<input checked="" type="checkbox"/>
git commit	<input checked="" type="checkbox"/>
git merge bugFix	<input checked="" type="checkbox"/>

任务 4:

\$ git checkout -b bugFix	<input checked="" type="checkbox"/>
\$ git commit	<input checked="" type="checkbox"/>
\$ git checkout main	<input checked="" type="checkbox"/>
\$ git commit	<input checked="" type="checkbox"/>
\$ git checkout bugFix	<input checked="" type="checkbox"/>
\$ git rebase main	<input checked="" type="checkbox"/>

(二) 主要页面-高级篇

任务 1:

git checkout C4	<input checked="" type="checkbox"/>
-----------------	-------------------------------------


任务 2:

git checkout bugFix^	<input checked="" type="checkbox"/>
----------------------	-------------------------------------

任务 3:

git branch -f main C6	<input checked="" type="checkbox"/>
git checkout HEAD~1	<input checked="" type="checkbox"/>
git branch -f bugFix HEAD~1	

任务 4:

git reset HEAD~1	<input checked="" type="checkbox"/>
git checkout pushed	<input checked="" type="checkbox"/>
git revert HEAD	

(三) 主要页面-移动提交记录

任务 1:

reset --forSolution	<input checked="" type="checkbox"/>
git cherry-pick C3 C4 C7	<input checked="" type="checkbox"/>

任务 2:

```
git rebase -i overHere
```

然后按照图片排序

(四) 主要页面-杂项

任务 1:

```
git rebase -i main
```

排序

```
git rebase bugFix main
```

任务 2:

```
git rebase -i HEAD~2
```

排序


```
git commit --amend
```

```
git rebase -i HEAD~2
```

排序

```
git rebase caption main
```

任务 3:

git checkout main	<input checked="" type="checkbox"/>
git cherry-pick C2	<input checked="" type="checkbox"/>
git commit --amend	
git cherry-pick C3	<input type="checkbox"/>

任务 4:

git tag v1 side~1	<input checked="" type="checkbox"/>
git tag v0 main~2	<input checked="" type="checkbox"/>
git checkout v1	<input checked="" type="checkbox"/>

任务 5:

git commit	
------------	---

(五) 主要页面-高级话题*

任务 1:

```
git rebase main bugFix
git rebase bugFix side
git rebase side another
git rebase another main
```

任务 2:

```
git branch bugWork main^^2^
echo "level solved! type
```

任务 3:

```
git checkout one
git cherry-pick C4 C3 C2
git checkout two
git cherry-pick C5 C4 C3 C2
git branch -f three C2
```

(六) 远程页面-Git 远程仓库

任务 1:

```
git clone
```

任务 2:

```
git commit
git checkout o/main
git commit
```

任务 3:

```
git fetch
```

任务 4:

```
git pull
```

任务 5:

```
git branch bugWork main^^2^
echo "level solved! type
```

任务 6:

```
git commit
git commit
git push
```

任务 7:

```
git clone
git fakeTeamwork
git commit
git pull --rebase
git push
```



任务 8:

```
git reset --hard o/main
```



在本程序中默认的行为是 `--hard` 硬重置，可以省略掉那个选项以避免麻烦！但是要记录 Git 默认的是 `--mixed`。

```
git checkout -b feature C2
git push origin feature
```



(七) 远程页面-Git 远程仓库高级操作

任务 1:

```
git fetch
git rebase o/main side1
git rebase side1 side2
git rebase side2 side3
git rebase side3 main
git push
```

任务 2:

```
git checkout main
git pull
git merge side1
git merge side2
git merge side3
git push
```

任务 3:

```
git checkout -b side o/main
local branch "side" set to
rack remote branch "o/main"

git commit
git pull --rebase
git push
```

任务 4:

```
git push origin main
git push origin foo
```

任务 5:

```
git push origin main^:foo
git push origin foo:main
```

任务 6:

```
git fetch origin c3:foo
git fetch origin c6:main
git checkout foo
git merge main
```

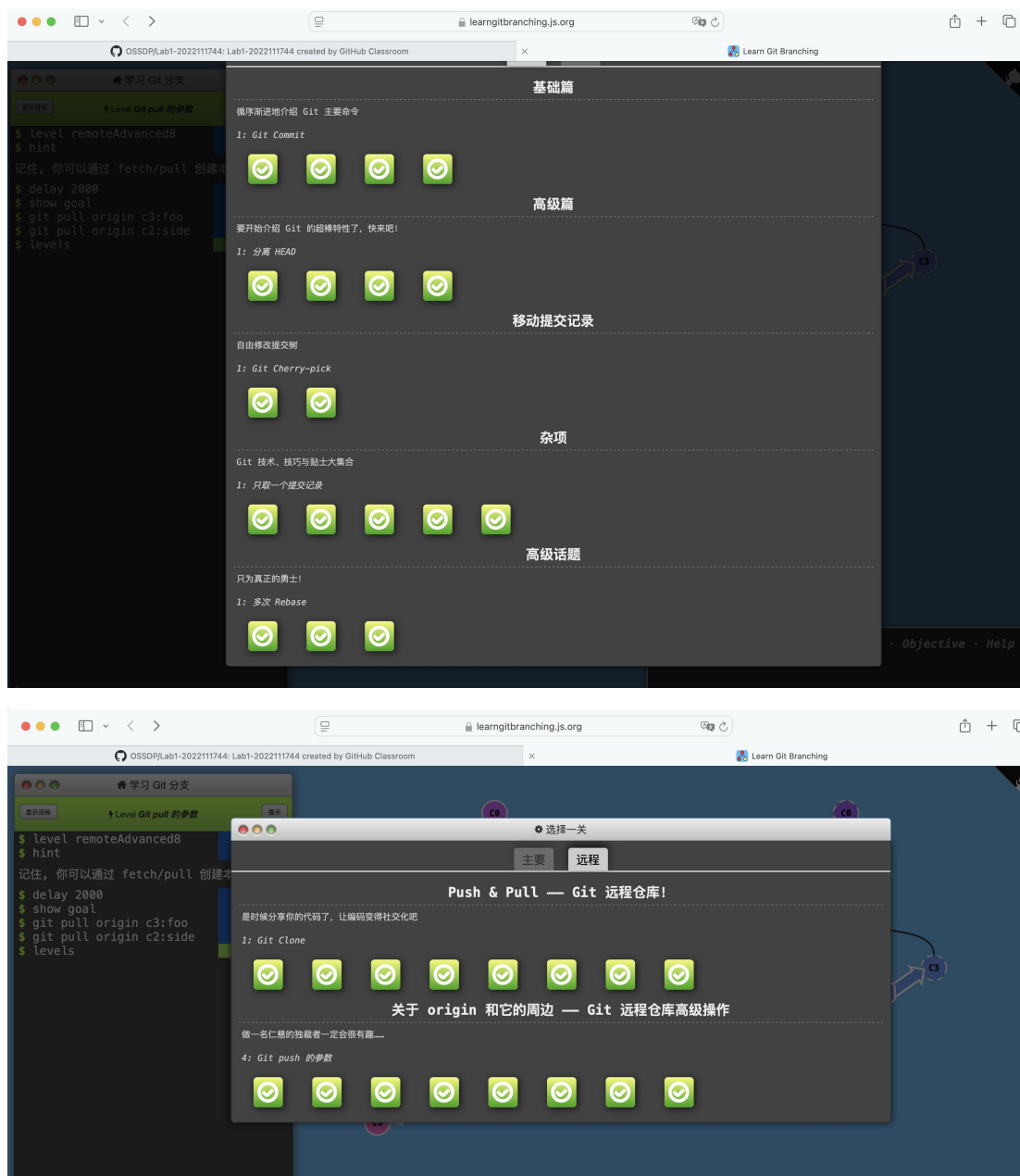
任务 7:

```
git push origin :foo
git fetch origin :bar
```

任务 8:

```
git pull origin c3:foo
git pull origin c2:side
```

(八) 通关后的主界面截图
完成规定任务



4 小结

实验收获

1. 版本控制的基本操作：

- 学习了如何初始化一个 Git 仓库，并将本地代码纳入版本控制。这为后续的开发提供了良好的基础。

2. 掌握了 Git 的提交与撤销操作：

- 理解了如何提交代码更改，包括使用 `git add` 和 `git commit` 的基本流程。此外，学会了如何撤销最近的提交，这在实际开发中是非常重要的技能。

3. 对比与差异检测：

- 使用 `git status` 和 `git diff` 命令来检查工作区与暂存区的状态，以及查看文件的具体修改内容。这帮助我更好地管理代码的变更。

4. 推送代码到远程仓库：

- 学习了如何将本地仓库的更改推送到远程 GitHub 仓库，掌握了使用 HTTPS 进行身份验证的方法。

5. 处理权限问题：

- 了解了常见的推送错误（如 403 错误）及其解决方案，包括检查权限和使用个人访问令牌（PAT）。

总结

通过本次实验，我深入理解了 Git 的基本操作和工作原理，掌握了版本控制的核心技能，这将极大地帮助我在未来的开发工作中提高效率。

率并减少错误。同时，我也认识到了在实际开发过程中遇到的问题和解决方法，使我在遇到类似情况时能够更自信地应对。