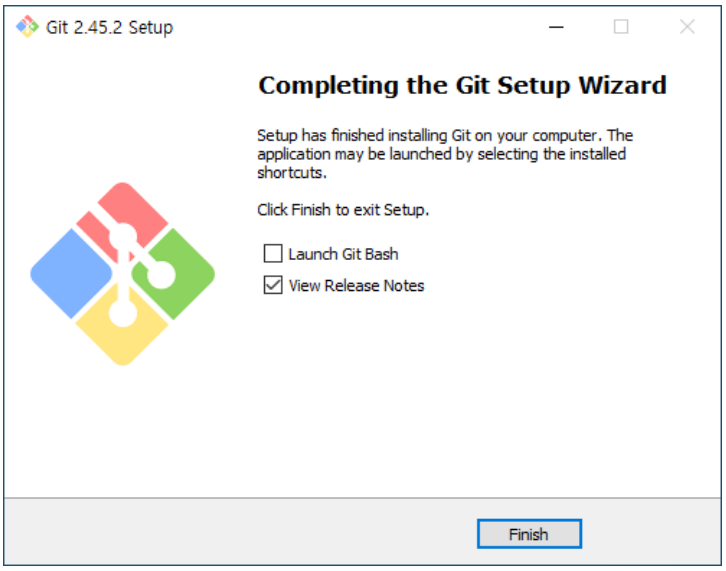
1. Git&Github 개요

1) Git 설치

😀실습1-1. Git 설치하기

✔️ Install 클릭 이후 총 15단계 Next 진행

✔️ 각 단계별 기본값은 수정하지 않음



✔️ 설치완료 후 Finish 클릭

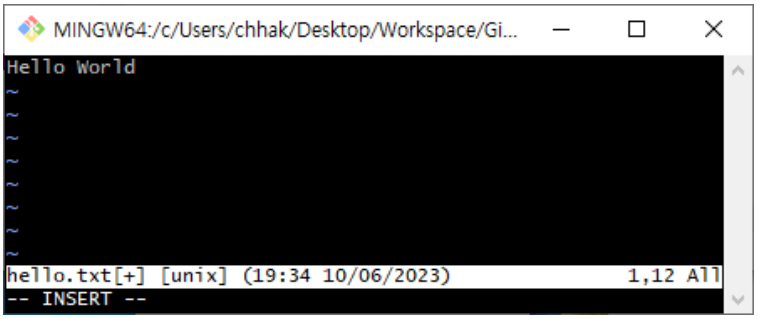
✔️ 바탕화면에서 마우스 오른버튼 Open Git Bash here 클릭

2) Git bash 기본 명령어

명령어	사용 예	설명
ls	ls ls -l ls -al	- 현재 디렉터리 조회 - 현재 디렉터리 상세 조회 - 현재 디렉터리 숨김 포함 조회
cd	cd / cd ./ cd ../	디렉터리 이동
rm	rm <file> rm -rf <directory>	파일 또는 디렉터리 삭제
mkdir	mkdir <directory>	디렉터리 생성
touch	touch <file>	파일 생성
cat	cat <file>	파일 내용 출력
clear	clear	화면 지우기
vi	vi <file>	편집기 실행

😀실습2-1. Git bash 기본 명령어 실습하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ./Workspace
$ mkdir Git
$ cd ./Git
$ mkdir ch01
$ cd ch01
$ vi hello.txt
```



✔️ i 입력(INSERT MODE)
✔️ Hello World 입력
✔️ esc 입력
✔️ :wq 입력

2. 버전관리

1) 버전관리 기본

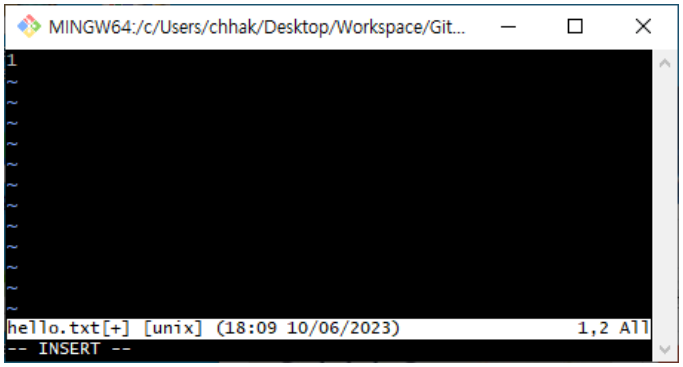
주요 명령어	사용 예	설명
git init	git init	새로운 Git 저장소 초기화
git config	git config --global user.name git config --global user.email	Git 환경 설정
git status	git status	Git 저장소 상태 확인
git add	git add <file> git add .	- 특정 파일 스테이징 - 모든 파일 및 디렉터리 스테이징
git commit	git commit -m <message> git commit -am <message>	- 스테이지 파일 커밋 - 동시에 스테이지와 파일 커밋
git log	git log git log --stat git log --oneline git log --graph	- 커밋 기록 확인 - 커밋 기록 통계 정보 확인 - 커밋 기록 요약 정보 확인 - 커밋 기록 그래프 정보 확인

😀실습1-1. Git 저장소 생성 및 환경 설정

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ./Workspace/Git

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git
$ git config --global user.email "chhak0503@gmail.com"
$ git config --global user.name "chhak0503"
$ git config --list

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git
$ git init

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git status
On branch master
No commits yet
nothing to commit (create/copy files and use "git add" to track)
```

😀실습1-2. 문서 생성 및 내용 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ mkdir ch02
$ cd ch02
$ vi hello.txt
```

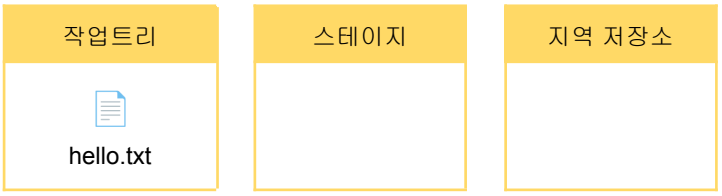


✔️ i 입력(INSERT MODE)
✔️ 숫자 1 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ ls -l
total 1
-rw-r--r-- 1 chhak 197121 2 Jun 10 16:16 hello.txt
```

😀실습1-3. 문서 현재 상태 확인

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
Untracked files:
        hello.txt
```



😀실습1-4. 문서 Staging 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git add hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
Changes not staged for commit:
        new file: hello.txt
```

😀실습1-5. 문서 Commit 하기

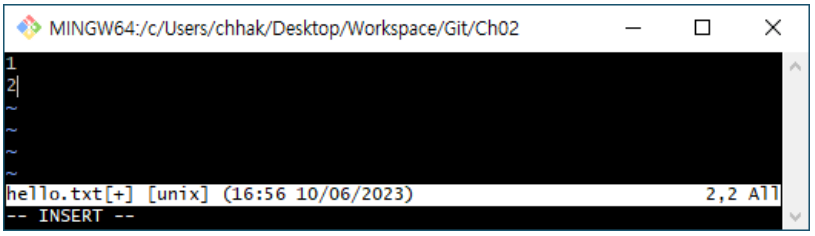
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -m "add 1"
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
nothing to commit, working tree clean
```

😀실습1-6. 문서 버전 이력 확인하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log
commit cb8e0f15247a5691fdb7e768d6d6ec9360724046 (HEAD -> master)
...
        add 1
```

😀실습1-7. 문서 버전 수정하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi hello.txt
```



✔️ i 입력(INSERT MODE)
✔️ 숫자 2 추가
✔️ esc 입력
✔️ :wq 입력

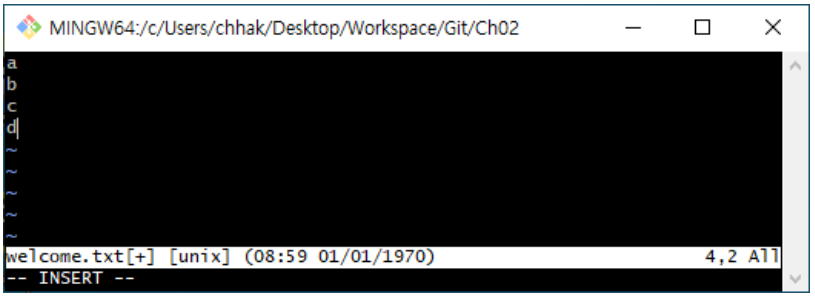
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
Changes not staged for commit:
        modified: hello.txt
```

😀실습1-8. 문서 버전 Staging & Commit 후 이력 확인

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git add hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -m "add 2"

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log
commit b3beefd1993adf7422e5d350fc139d582b025210 (HEAD -> master)
...
        add 2
commit cb8e0f15247a5691fdb7e768d6d6ec9360724046
...
        add 1
```

😀실습1-9. 새 문서 버전 추가하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi welcome.txt
```

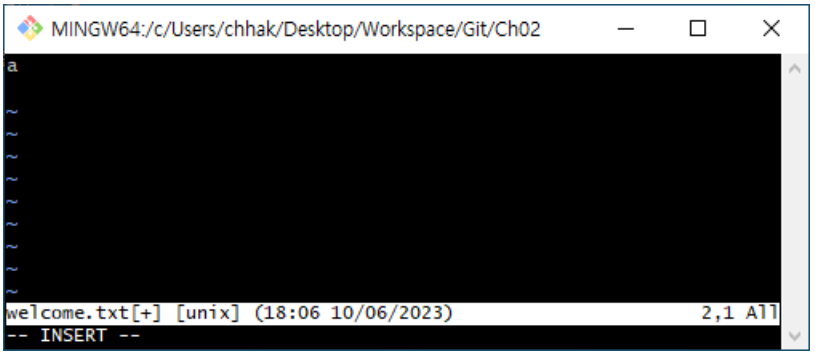


✔️ i 입력(INSERT MODE)
✔️ a, b, c, d 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
  Untracked files:
        welcome.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git add welcome.txt
$ git status
...
Changes to be committed:
         new file: welcome.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -m "add a, b, c, d"
...
 create mode 100644 ch02/welcome.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
nothing to commit, working tree clean
```

😀실습1-10. 문서 버전 최종 수정하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi welcome.txt
```



✔️ i 입력(INSERT MODE)
✔️ b, c, d 삭제
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
  Changes not staged for commit:
        modified: welcome.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -am "delete b, c, d"
...

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
...
nothing to commit, working tree clean
```

😀실습1-11. 문서 버전 이력 상세 확인하기

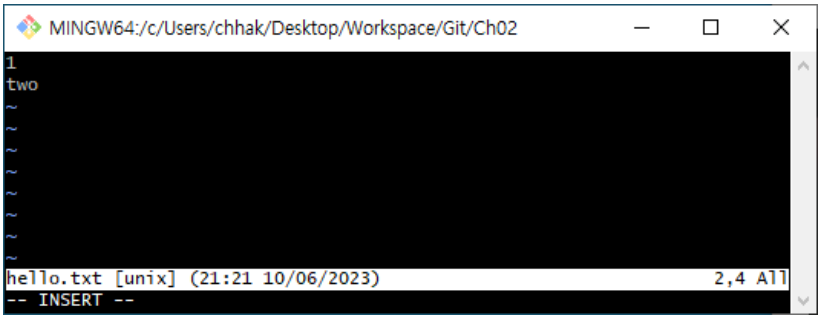
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --stat
commit d28ae8c1a4445518bf3e5b5b52261342e22416db (HEAD -> master)
...
        delete b, c, d
```

2) 버전관리 고급

주요 명령어	사용 예	설명
git checkout	git checkout <file>	- 특정 커밋 파일 내용 복원
git reset	git reset git reset . git reset HEAD git reset HEAD^ git reset HEAD^^ git reset HEAD~1 git reset HEAD~2 git reset --soft HEAD^ git reset --mixed HEAD^ git reset --hard HEAD^ git reset <COMMIT_ID>	- 스테이지 내용 내리기 - git reset 동일 - git reset 동일 - 한 단계 이전 커밋으로 되돌아가기 - 두 단계 이전 커밋으로 되돌아가기 - HEAD^ 동일 - HEAD^^ 동일 - 커밋 이동, 스테이지 유지, 작업트리 유지 - 커밋 이동, 스테이지 수정, 작업트리 유지 - 커밋 이동, 스테이지 수정, 작업트리 수정 - 특정 커밋으로 기록 없이 되돌아가기
git revert	git revert HEAD git revert <COMMIT_ID>	- 이전 커밋으로 기록 남기고 되돌아가기(취소하기) - 특정 커밋으로 기록 남기고 되돌아가기(취소하기)

😀실습2-1. checkout 실습하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi hello.txt
```



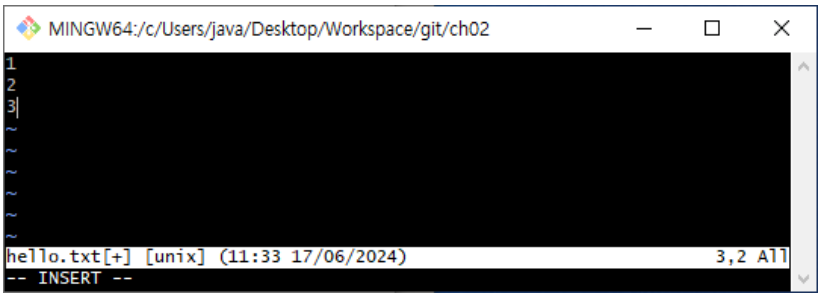
✔️ i 입력(INSERT MODE)
✔️ 2 → two 수정
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
Changes not staged for commit:
        modified: hello.txt
```

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git add hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
Changes to be committed:
        new file: hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git reset HEAD
Unstaged changes after reset:

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
Changes not staged for commit:
       modified: hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git checkout hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
nothing to commit, working tree clean

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ cat hello.txt
1
2
```

😀실습2-2. reset 실습하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi hello.txt
```



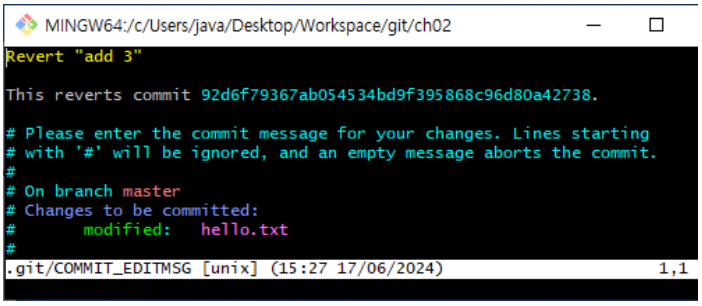
✔️ i 입력(INSERT MODE)
✔️ 숫자 3 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
Changes not staged for commit:
        modified: hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -am "add 3"

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
0ac637b (HEAD -> master) add 3
b3beefd add 2
cb8e0f1 add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git reset HEAD^
Unstaged changes after reset:

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
b3beefd (HEAD -> master) add 2
cb8e0f1 add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
Changes not staged for commit:
        modified: hello.txt
```

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ cat hello.txt
1
2
3

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git checkout hello.txt
Updated 1 path from the index

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ cat hello.txt
1
2

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
nothing to commit, working tree clean

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git reset --hard HEAD^
HEAD is now at cb8e0f1 add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
cb8e0f1 (HEAD -> master) add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
nothing to commit, working tree clean

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ cat hello.txt
1
```

😀실습2-3. revert 실습하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi hello.txt 👈 숫자 2 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -am "add 2"
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ vi hello.txt 👈 숫자 3 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git commit -am "add 3"
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
ae2cf3f (HEAD -> master) add 3
de2bf7a add 2
cb8e0f1 add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git revert HEAD
```

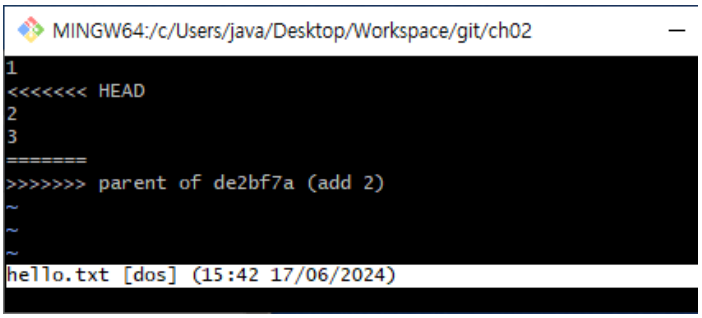


✔️ Revert 메시지 작성(기본값 사용)
✔️ :wq

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
6d6355d (HEAD -> master) Revert "add 3"
...

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ cat hello.txt
1
2
```

😀실습2-4. revert 충돌 실습하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git reset --hard HEAD~1
HEAD is now at ae2cf3f add 3

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
ae2cf3f (HEAD -> master) add 3
de2bf7a add 2
cb8e0f1 add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git revert <add 2 COMMIT_ID>
Auto-merging hello.txt
CONFLICT (content): Merge conflict in hello.txt
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master|REVERTING)
$ git status
...
Unmerged paths:
  (use "git restore --staged <file>..." to unstage)
  (use "git add <file>..." to mark resolution)
        both modified:   hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master|REVERTING)
$ vi hello.txt
```

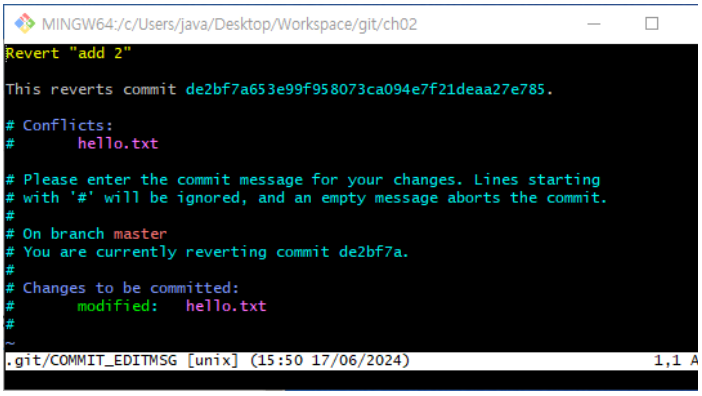


✔️ <<< 부터 >>> 까지 삭제

✔️ :wq

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master|REVERTING)
$ git add hello.txt
```

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master|REVERTING)
$ git status
...
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   hello.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master|REVERTING)
$ git revert --continue
```



✔️ Revert 메시지 작성(기본값 사용)
✔️ :wq

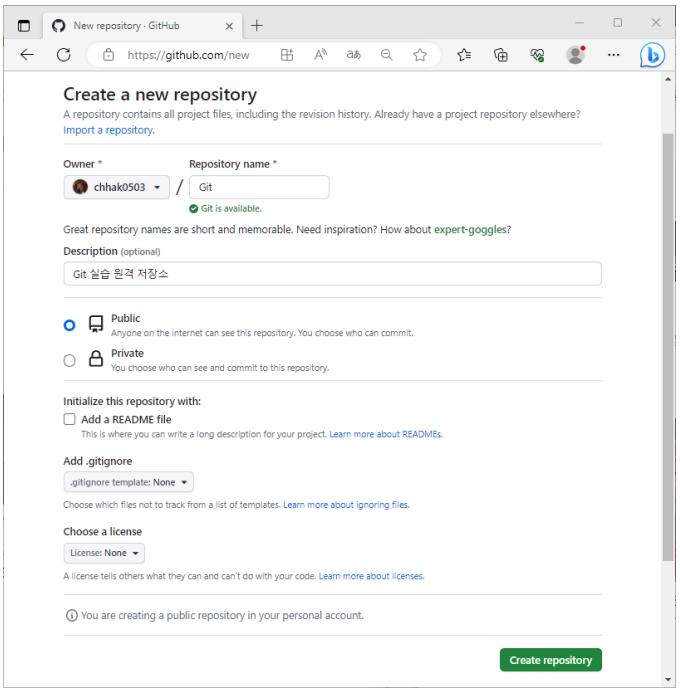
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git status
nothing to commit, working tree clean

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ git log --oneline
f234dab (HEAD -> master) Revert "add 2"
ae2cf3f add 3
de2bf7a add 2
cb8e0f1 add 1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch02 (master)
$ cat hello.txt
1
```

3. 원격 저장소

1) 원격 저장소 생성과 연결

주요 명령어	사용 예	설명
git remote	git remote add origin <remote-url> git remote -v	- 원격 저장소 연결 - 원격 저장소 연결 확인

😀실습 1-1. Github 원격 저장소 생성하기



✔️ 저장소 이름(Git 입력)
✔️ 저장소 공개 여부(Public 선택)
✔️ Create repository 버튼 클릭

😀실습 1-2. 원격 저장소 연결하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git remote add origin https://github.com/계정명/저장소명.git

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git remote -v
origin  https://github.com/계정명/저장소명.git (fetch)
origin  https://github.com/계정명/저장소명.git (push)
```

2) 원격 저장소 push와 pull

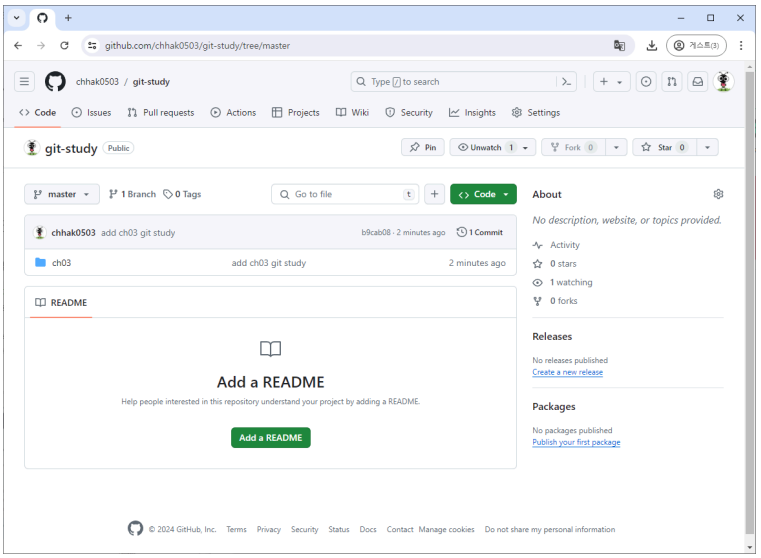
명령어	사용 예	설명
git push	git push origin master git push -u origin master	- 원격 저장소 커밋 등록 - 추적 브랜치 설정 이후 커밋 등록
git pull	git pull origin master	원격 저장소 커밋 병합

😀실습 2-1. 문서 생성 및 내용 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ mkdir ch03
$ cd ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ vi test1.txt 👈 알파벳 a 입력 후 저장/종료
$ vi test2.txt 👈 알파벳 a 입력 후 저장/종료
$ vi test3.txt 👈 알파벳 a 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ cd ..

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git add ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git commit -m 'add ch03 git study'
[master 59ca7be] add ch03 git study
3 files changed, 3 insertions(+)
create mode 100644 ch03/test1.txt
create mode 100644 ch03/test2.txt
create mode 100644 ch03/test3.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git log
commit 59ca7be2f049f03453de48214a8489555f7d1e38 (HEAD -> master)
Author: chhak0503 <chhak0503@gmail.com>
...
    add ch03 git study
```

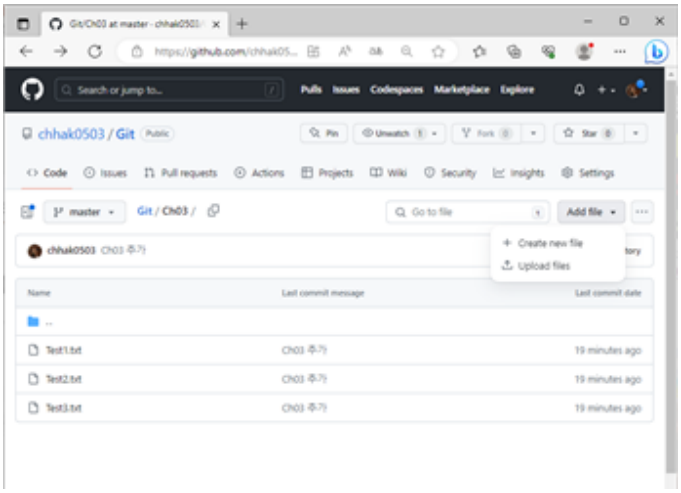
😀실습 2-2. 원격 저장소 push 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git push origin master
...
Total 13 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/chhak/Git.git
* [new branch] master -> master
```

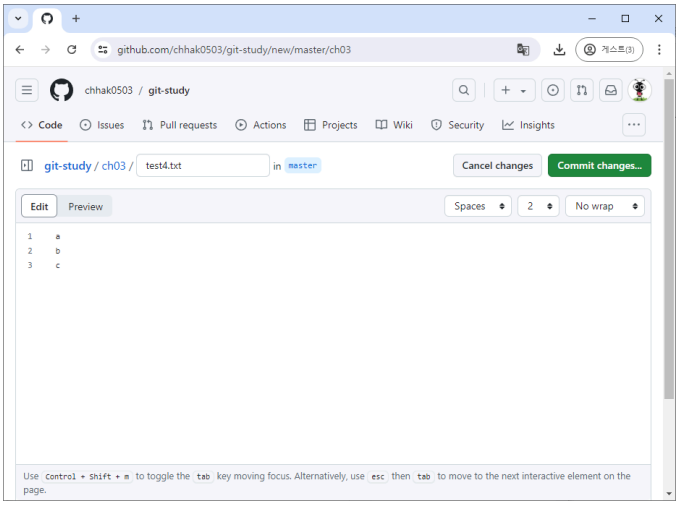


✔️ 원격 저장소 확인
✔️ 커밋 기록 확인

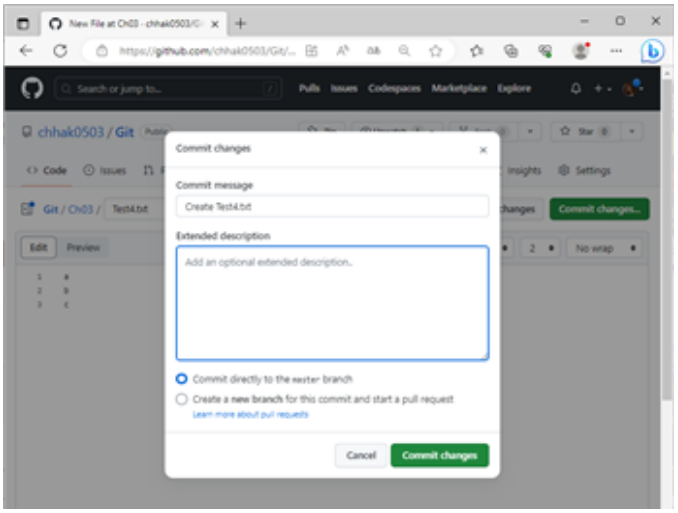
😀실습 2-3. 원격 저장소 문서 생성하기



✔️ Add file 클릭
✔️ Create new file 클릭



✔️ 파일명 test4.txt 입력
✔️ a, b, c 입력
✔️ Commit changes… 클릭



✔️ Commit message 확인
✔️ Commit changes 클릭
✔️ test4.txt 파일 생성 확인
✔️ Commit 이력 확인

😀실습 2-4. 원격 저장소 pull 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git pull origin master
...
Fast-forward
ch03/test4.txt | 3 +++
1 file changed, 3 insertions(+)
create mode 100644 ch03/test4.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ cd ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ ls -l
total 4
-rw-r--r-- 1 chhak 197121 2 Jun 11 11:58 test1.txt
-rw-r--r-- 1 chhak 197121 2 Jun 11 11:58 test2.txt
-rw-r--r-- 1 chhak 197121 2 Jun 11 11:58 test3.txt
-rw-r--r-- 1 chhak 197121 9 Jun 11 14:54 test4.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ cat test4.txt
a
b
c

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ git log
commit fa482d13f64903ddfc7e503ecca42ec2e0d447bf (HEAD -> master, origin/master)
Author: chhak0503 <64509878+chhak0503@users.noreply.github.com>
    Create test4.txt
...
```

3) 원격 저장소 복제

명령어	사용 예	설명
git clone	git clone <remote-url>	원격 저장소 복제

😀실습 3-1. 원격 저장소 복제하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ git clone https://github.com/계정명/저장소명.git Git_home
Cloning into 'Git_home'...
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ git clone https://github.com/계정명/저장소명.git Git_office
Cloning into 'Git_office'...
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd Git_home/

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_home (master)
$ git log
commit fa482d13f64903ddfc7e503ecca42ec2e0d447bf (HEAD -> master, origin/master)
Author: chhak0503 <64509878+chhak0503@users.noreply.github.com>
    Create test4.txt
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_home (master)
$ cd ..

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd Git_office/

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_office (master)
$ git log
commit fa482d13f64903ddfc7e503ecca42ec2e0d447bf (HEAD -> master, origin/master)
Author: chhak0503 <64509878+chhak0503@users.noreply.github.com>
    Create test4.txt
...
```

😀실습 3-2. 원격 저장소 push 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Git_home/ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_home/ch03 (master)
$ vi test4.txt
```

✔️ i 입력(INSERT MODE)
✔️ d, e, f 입력
✔️ esc 입력
✔️ :wq 입력

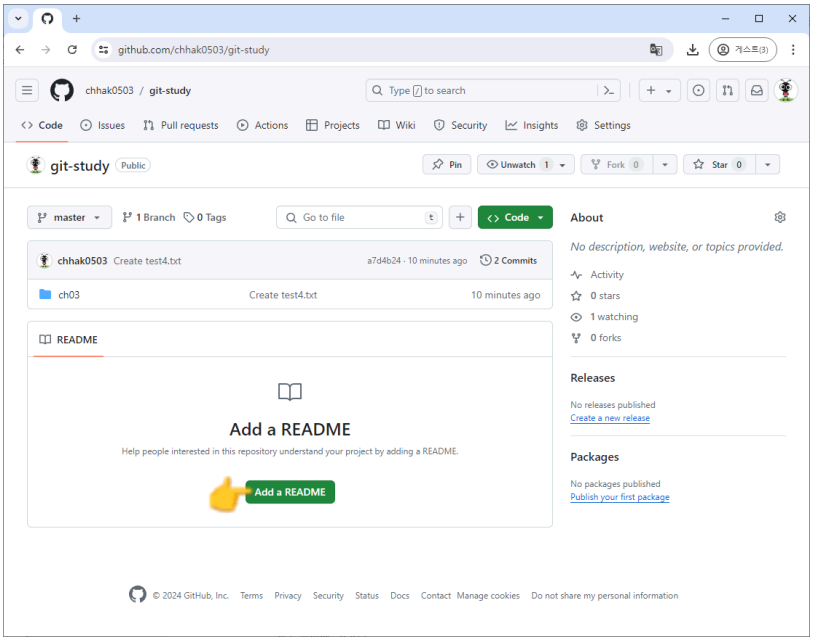
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_home/ch03 (master)
$ git add test4.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_home/ch03 (master)
$ git commit -m 'add d, e, f'
[master 7ccd5ba] add d, e, f
1 file changed, 3 insertions(+)

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_home/ch03 (master)
$ git push origin master
...
To https://github.com/chhak/Git.git
fa482d1..7ccd5ba master -> master
```

😀실습 3-3. 원격 저장소 pull 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Git_office

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_office (master)
$ git pull origin master
...
Fast-forward
 ch03/test4.txt | 3 +++
 1 file changed, 3 insertions(+)

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_office (master)
$ cd ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_office/ch03 (master)
$ ls -l
total 4
-rw-r--r-- 1 chhak 197121  3 Jun 11 15:09 test1.txt
-rw-r--r-- 1 chhak 197121  3 Jun 11 15:09 test2.txt
-rw-r--r-- 1 chhak 197121  3 Jun 11 15:09 test3.txt
-rw-r--r-- 1 chhak 197121 18 Jun 11 15:29 test4.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Git_office/ch03 (master)
$ cat test4.txt
a
b
c
d
e
f
```

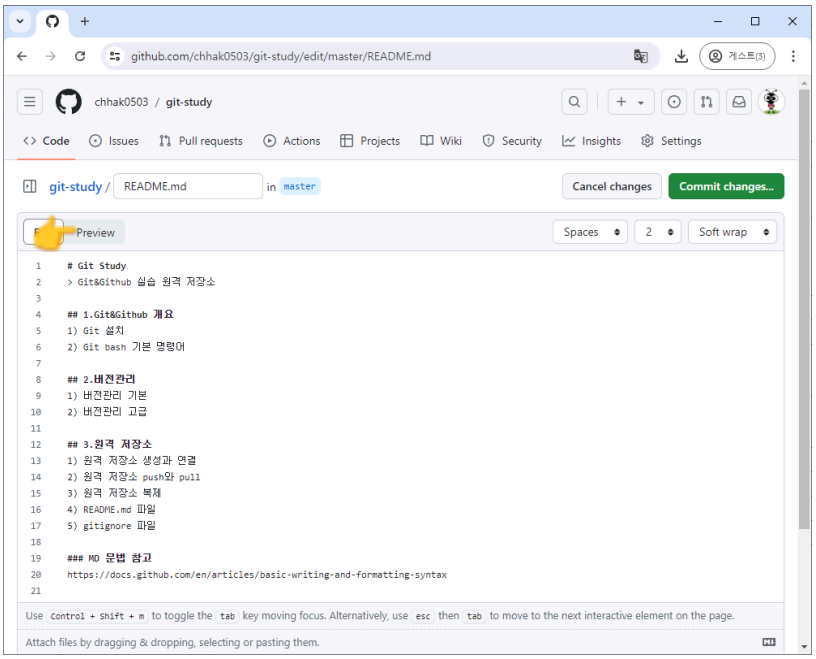
4) README.md

😀실습 4-1. README 파일 생성하기



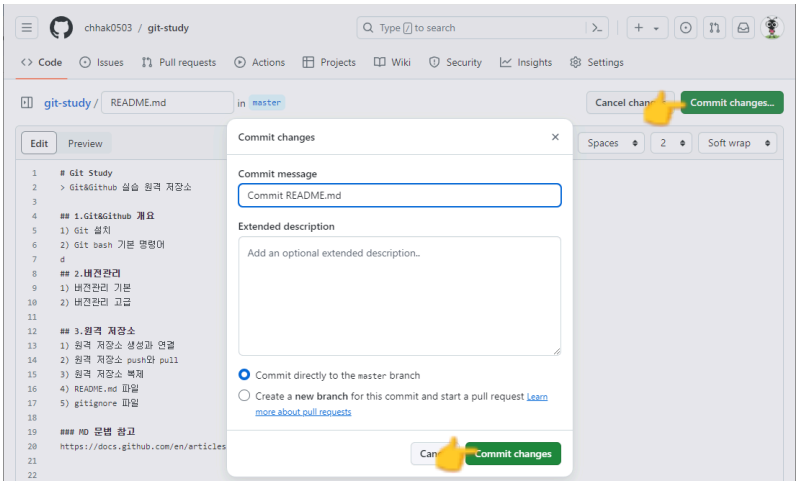
✔️ Add a README 클릭

😀실습 4-2. README 작성하기



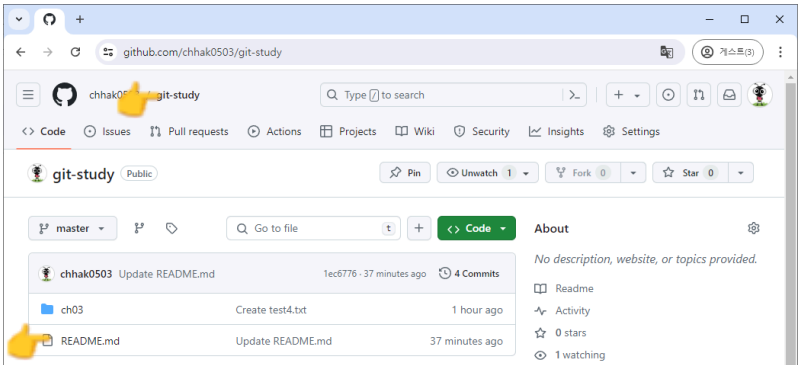
✔️ README 내용 입력
✔️ Preview 확인

😀실습 4-3. README 커밋하기



✔️ Commit changes… 클릭
✔️ Commit changes 클릭

😀실습 4-4. README 확인하기



✔️ 원격 저장소 이름 클릭
✔️ README 확인

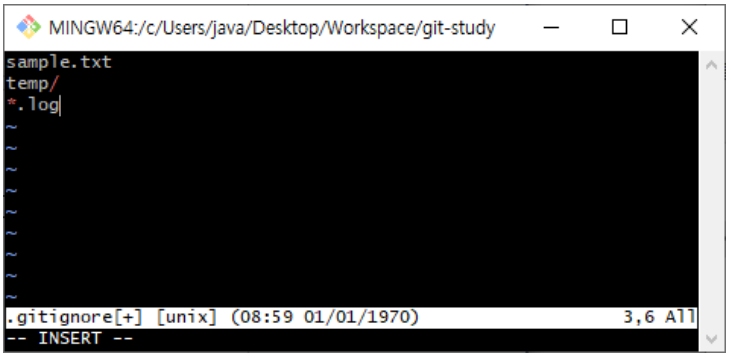
😀실습 4-5. 원격 저장소 pull 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ git pull origin master
...

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ ls -l
total 5
-rw-r--r-- 1 java 197121 457 Jun 18 12:29 README.md
...
```

5) .gitignore

😀실습 5-1. .gitignore 파일 생성하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git/ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ touch  sample.txt  sample.log  test5.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ mkdir  sub  temp

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ touch  sub/test.txt  temp/test.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ vi .gitignore
```



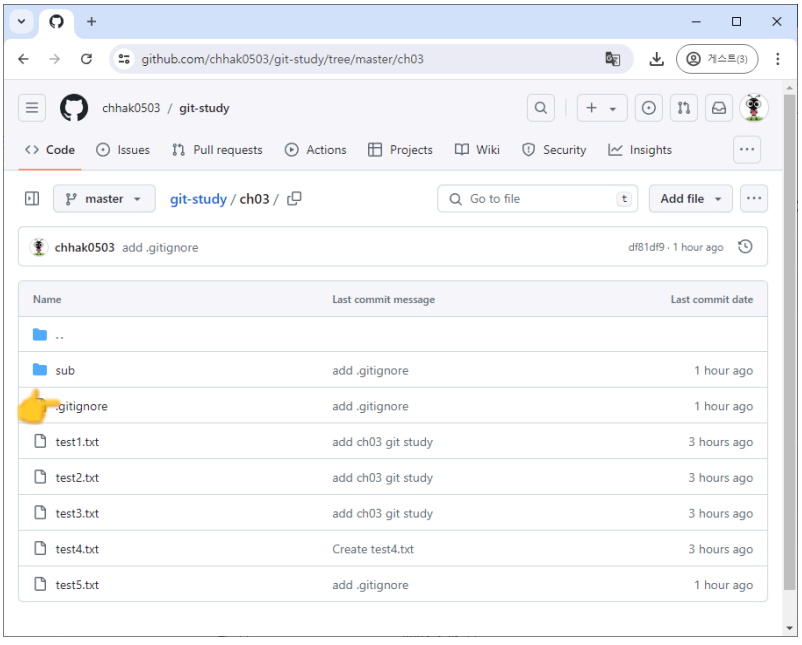
✔️ i 입력(INSERT MODE)
✔️ 내용 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ ls -al
total 13
...
-rw-r--r-- 1 java 197121 23 Jun 18 11:57 .gitignore
-rw-r--r-- 1 java 197121  0 Jun 18 12:12 sample.log
-rw-r--r-- 1 java 197121  0 Jun 18 12:12 sample.txt
drwxr-xr-x 1 java 197121  0 Jun 18 12:14 sub/
drwxr-xr-x 1 java 197121  0 Jun 18 12:14 temp/
...
-rw-r--r-- 1 java 197121 0 Jun 18 12:12 test5.txt
```

😀실습 5-2. .gitignore commit & push하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git/ch03

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ git status
...
Untracked files:
        .gitignore
        sub/
        test5.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ git add .

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ git commit -m "add .gitignore"

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch03 (master)
$ git push origin master
...
```

😀실습 5-3. 원격 저장소 확인하기



✔️ .gitignore 파일 확인
✔️ 업로드 파일 확인

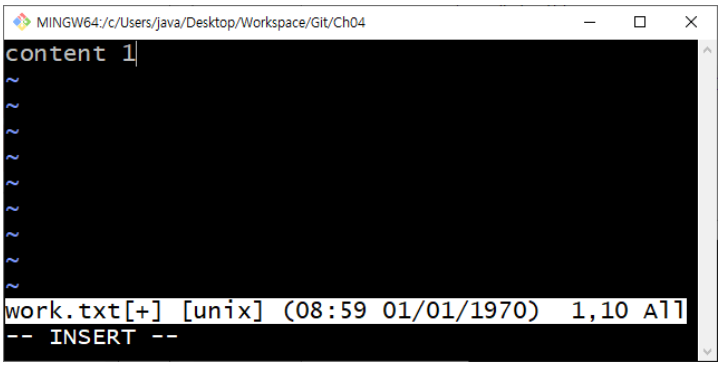
4. 브랜치

1) 브랜치 기본

주요 명령어	사용 예	설명
git branch	git branch git branch <branch_name> git branch -d <branch_name>	- 현재 브랜치 나열 - 새 브랜치 생성 - 브랜치 삭제
git checkout	git checkout <branch_name> git checkout -b <branch_name>	- 브랜치 전환 - 새 브랜치 생성 후 브랜치 전환

😀실습 1-1. 실습 디렉터리 및 파일 생성하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ mkdir ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git (master)
$ cd ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work1.txt
```



✔️ i 입력(INSERT MODE)
✔️ content 1 입력
✔️ esc 입력
✔️ :wq 입력

😀실습 1-2. 파일 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git add work1.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -m 'content 1'
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log
commit ea2d890285646763f7d20cf98bbaf2811eda0576 (HEAD -> master)
Author: chhak0503 <chhak0503@gmail.com>
        content 1
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work1.txt 👈 'content 2' 추가 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -am 'content 2'
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work1.txt 👈 'content 3' 추가 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -am 'content 3'
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log
commit 1cc55821e798613e54ced48889d1687282... (HEAD -> master)
Author: chhak0503 <chhak0503@gmail.com>
        content 3
...
```

😀실습 1-3. 브랜치 확인 및 생성하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch
* master

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch apple

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch
apple
* master

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log
commit 1cc55821e798613e54ced48889d1687282... (HEAD -> master, apple)
Author: chhak0503 <chhak0503@gmail.com>
        content 3
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch banana

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch cherry

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch
apple
banana
cherry
* master

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log
commit 1cc55821e798613e54ced48889d1687282... (HEAD -> master, cherry, banana, apple)
Author: chhak0503 <chhak0503@gmail.com>
        content 3
...
```

😀실습 1-4. 파일 수정 후 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work1.txt 👈 'content 4' 추가 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -am 'content 4 by master'
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline
45fb5f7 (HEAD -> master) content 4 by master
1cc5582 (cherry, banana, apple) content 3
b6cac4c content 2
ea2d890 content 1
...
```

😀실습 1-5. 브랜치 전환 후 파일 내용 확인하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git checkout apple
Switched to branch 'apple'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ git log --oneline
1cc5582 (HEAD -> apple, cherry, banana) content 3
b6cac4c content 2
ea2d890 content 1
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ cat work1.txt
content 1
content 2
content 3
```

😀실습 1-6. 파일 수정 후 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ vi work1.txt 👈 'content 4 by apple' 추가 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ vi apple.txt 👈 'content 4 by apple' 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ git  add  work1.txt  apple.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ git commit -m 'content 4 by apple'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ git log --oneline --branches --graph
* 83bd291 (HEAD -> apple) content 4 by apple
| * 45fb5f7 (master) content 4 by master
|/
* 1cc5582 (cherry, banana) content 3
* b6cac4c content 2
* ea2d890 content 1
```

😀실습 1-7. 브랜치 전환 후 삭제하기

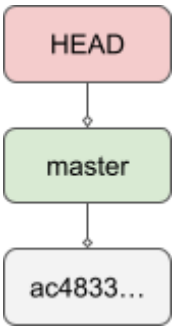
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (apple)
$ git checkout master

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch -d apple
error: the branch 'apple' is not fully merged
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch -d banana cherry
Deleted branch banana (was 5c0e4ba).
Deleted branch cherry (was 5c0e4ba).

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline --branches --graph
...
```

2) 브랜치 병합

주요 명령어	사용 예	설명
git merge	git merge <branch_name> git merge --abort	- 브랜치 병합 - 브랜치 병합 취소

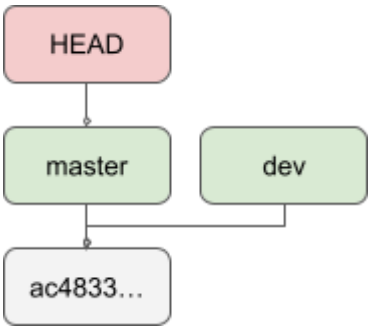
😀실습 2-1. 파일 생성 후 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git/ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work2.txt 👈 첫번째 줄에 'content 1 by master' 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git add work2.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -m 'commit 1 by master'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log
commit ac4833d5fd2cbd81cf619fbe3508496f25d69403 (HEAD -> master)
...
        commit 1 by master
```



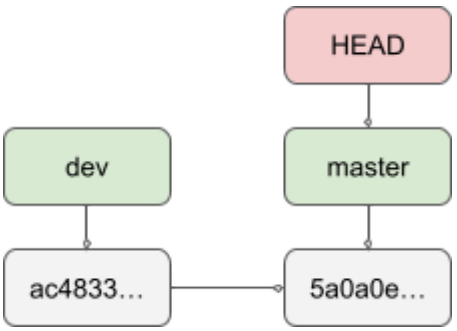
😀실습 2-2. 브랜치 생성하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch dev

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline
ac4833d (HEAD -> master, dev) commit 1 by master
```



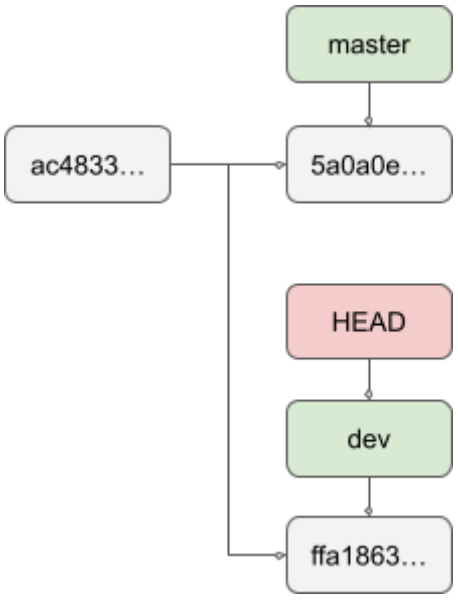
😀실습 2-3. 추가 파일 생성 후 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work3.txt 👈 첫번째 줄에 'content 1 by master' 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git add work3.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -m 'commit 2 by master'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline
5a0a0eb (HEAD -> master) commit 2 by master
ac4833d (dev) commit 1 by master
```



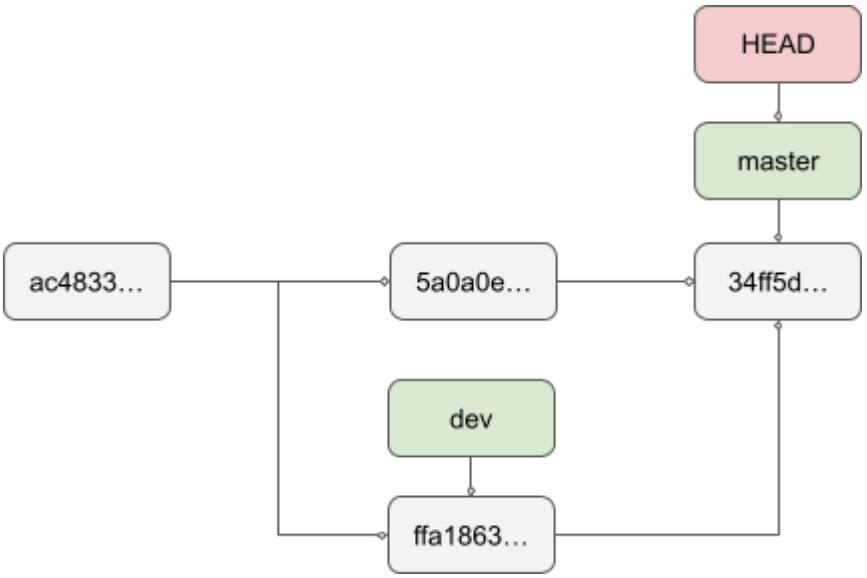
😀실습 2-4. 브랜치 전환 후 파일 생성 및 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git checkout dev
Switched to branch 'dev'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (dev)
$ vi work4.txt 👈 첫번째 줄에 'content 1 by dev' 입력 후 저장/종료

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (dev)
$ git add work4.txt

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (dev)
$ git commit -m 'commit 3 by dev'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (dev)
$ git log --oneline
ffa1863 (HEAD -> dev) commit 3 by dev
ac4833d commit 1 by master

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (dev)
$ git log --oneline --branches --graph
* ffa1863 (HEAD -> dev) commit 3 by dev
| * 5a0a0eb (master) commit 2 by master
|/
* ac4833d commit 1 by master
```



😀실습 2-5. master 브랜치 전환 후 병합하기

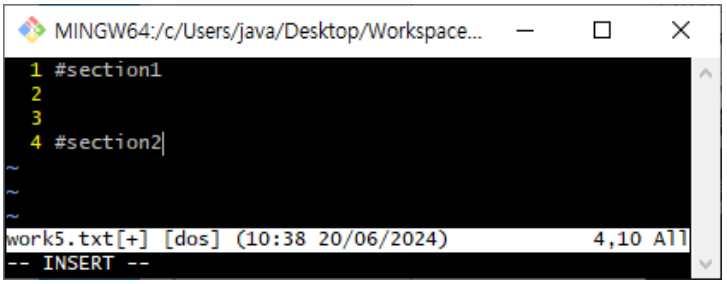
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (dev)
$ git checkout master
Switched to branch 'master'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git merge dev
Merge made by the 'ort' strategy.
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline --branches --graph
* 34ff5d9 (HEAD -> master) Merge branch 'dev'
|\
| * ffa1863 (dev) commit 3 by dev
* | 5a0a0eb commit 2 by master
|/
* ac4833d commit 1 by master
```



3) 브랜치 충돌

😀실습 3-1. 파일 생성 후 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git/ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work5.txt
```

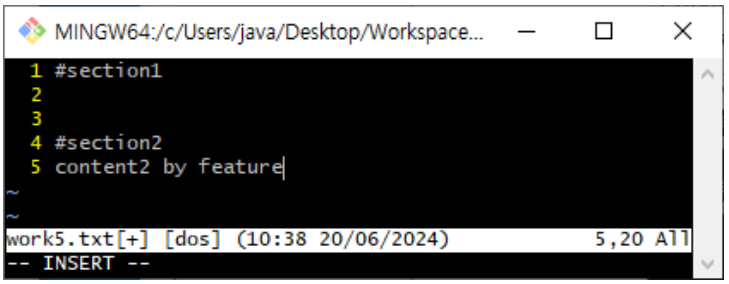


✔️ :set nu
✔️ i 입력(INSERT MODE)
✔️ 1, 4번 라인 내용 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -am 'work5 commit-1'
```

😀실습 3-2. 새 브랜치 생성 및 전환 후 커밋하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git checkout -b feature
Switched to branch 'feature'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ vi work5.txt
```

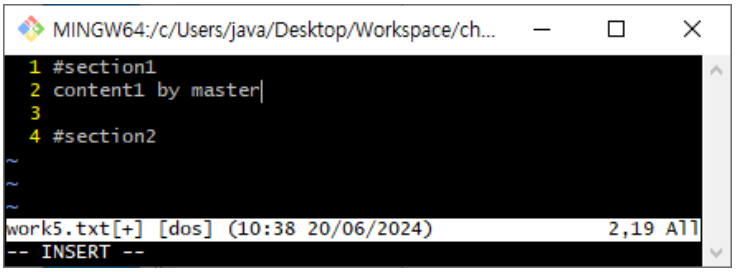


✔️ :set nu
✔️ i 입력(INSERT MODE)
✔️ 5번 라인 내용 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ git commit -am 'work5 commit-2'
```

😀실습 3-3. master 브랜치 전환 후 병합하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ git checkout master
Switched to branch 'master'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work5.txt
```

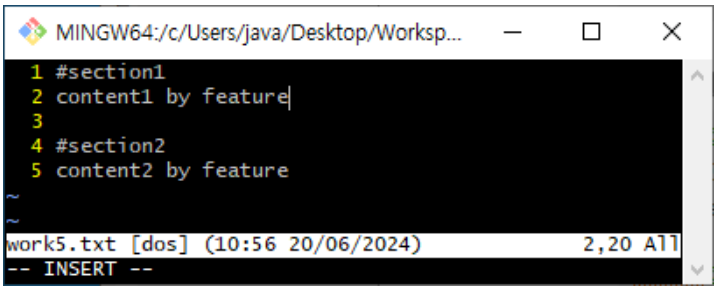


✔️ :set nu
✔️ i 입력(INSERT MODE)
✔️ 2번 라인 내용 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -am 'work5 commit-3'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git merge feature
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ cat work5.txt
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline --branches --graph
...
```

😀실습 3-4. 브랜치 전환 후 파일 수정하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git checkout feature
Switched to branch 'feature'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ vi work5.txt
```

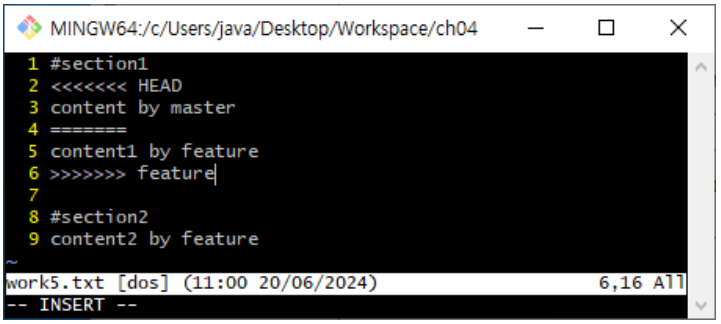


✔️ :set nu
✔️ i 입력(INSERT MODE)
✔️ 2번 라인 내용 입력
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ git commit -am 'work5 commit-4'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ git log --oneline --branches --graph
...
```

😀실습 3-5. master 브랜치 전환 후 병합하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (feature)
$ git checkout master
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git merge feature
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master|MERGING)
$ vi work5.txt
```

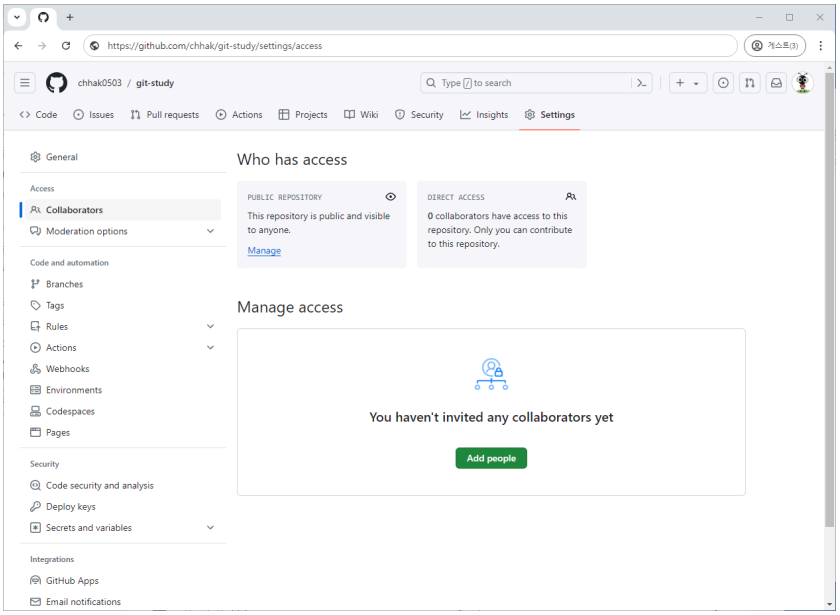


✔️ :set nu
✔️ INSERT MODE
✔️ 충돌 내용 수정
✔️ esc 입력
✔️ :wq 입력

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master|MERGING)
$ git status
Unmerged paths:
        both modified:   work5.txt
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master|MERGING)
$ git commit -am 'work5 commit-5'
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ cat work5.txt
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git log --oneline --branches --graph
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git branch -d feature
Deleted branch feature (was dc04cab).
```

4) 풀 리퀘스트

😀실습 4-1. Github Collaborators 추가하기



✔️ Github Repository > Settings > Collaborators 이동

✔️ Add people 클릭 후 협업자 email 등록(최소 4명 팀 구성)

😀실습 4-2. 파일 생성 및 커밋 후 푸시하기

bash #1

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ~/Desktop/Workspace/Git/ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ vi work6.txt 👈 첫번째 줄에 'content by master' 입력
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git commit -am 'work6 commit by master'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/Git/ch04 (master)
$ git push -u origin master
```

😀실습 4-3. 원격 저장소 복제 후 `git_user1` 브랜치 생성 및 푸시하기

bash #2

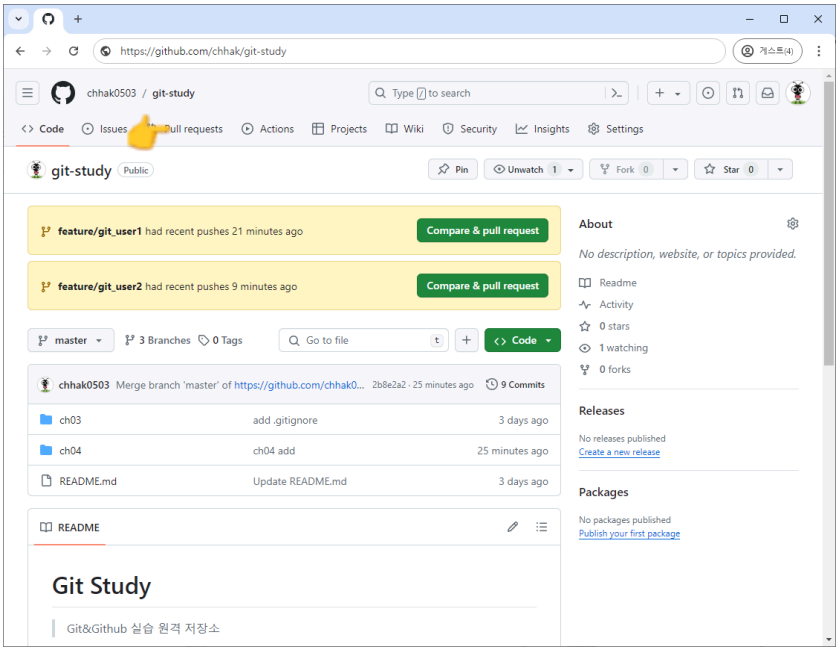
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ git clone <github-repository-url> git_user1

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ./git_user1/ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user1/ch04 (master)
$ git checkout -b feature/git_user1
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user1/ch04 (feature/git_user1)
$ vi work6.txt 👈 두번째 줄에 'content by git_user1' 입력

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user1/ch04 (feature/git_user1)
$ git commit -am 'work6 commit by git_user1'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user1/ch04 (feature/git_user1)
$ git push origin feature/git_user1
...
```

😀실습 4-4. 원격 저장소 복제 후 `git_user2` 브랜치 생성 및 푸시하기

bash #3

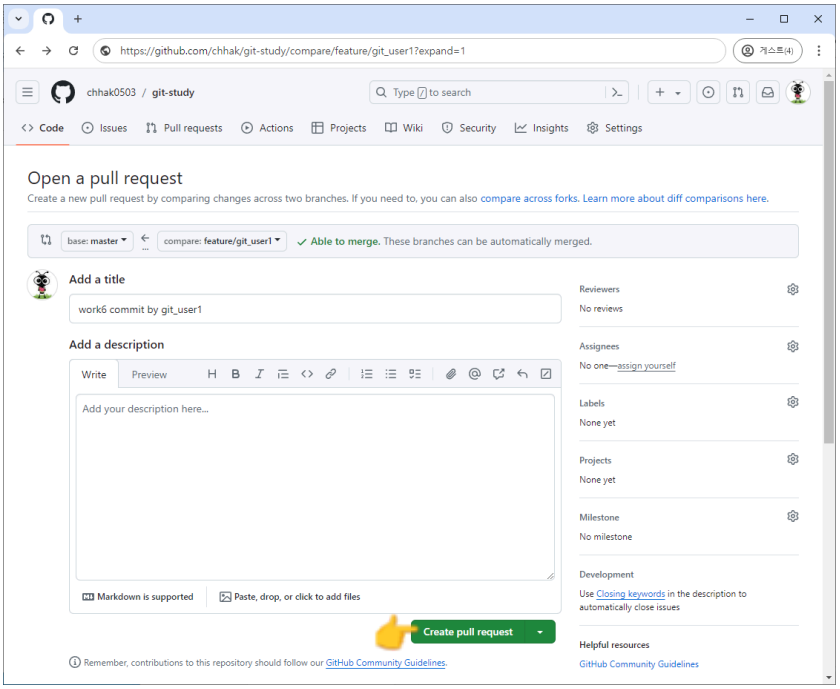
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ git clone <github-repository-url> git_user2

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop
$ cd ./git_user2/ch04

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user2/ch04 (master)
$ git checkout -b feature/git_user2
...
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user2/ch04 (feature/git_user2)
$ vi work6.txt 👈 두번째 줄에 'content by git_user2' 입력

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user2/ch04 (feature/git_user2)
$ git commit -am 'work6 commit by git_user2'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/git_user2/ch04 (feature/git_user2)
$ git push origin feature/git_user2
...
```

😀실습 4-5. Github 확인하기



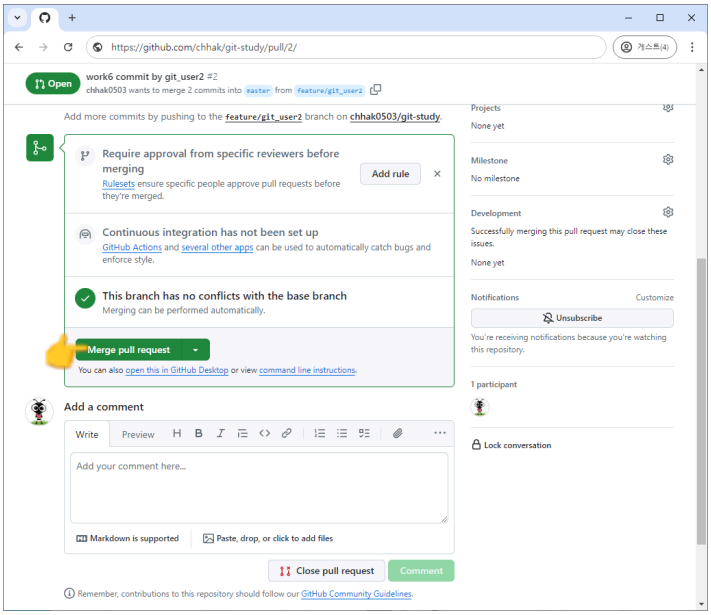
✔️ 각 브랜치 사용자 별 Compare & pull request 클릭 또는 상단 Pull requests 클릭

😀실습 4-6. 풀리퀘스트 요청 메시지 작성하기



✔️ title, description 입력 후 Create pull request 클릭

😀실습 4-7. 브랜치 충돌 여부 및 병합하기

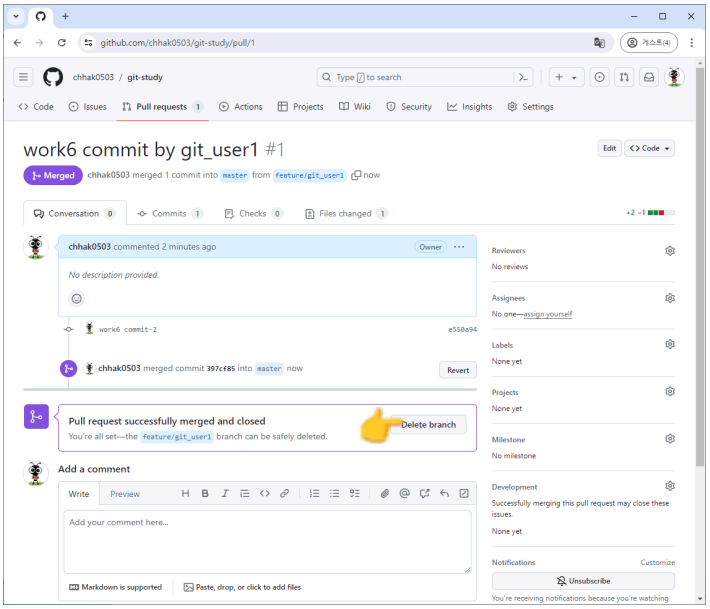


✔️ Merge pull request는 Github 담당자 또는 팀장이 수행하는 것이 일반적

✔️ 브랜치 충돌이 발생하면 충돌 해결 후 Merge 수행

✔️ 최종 Confirm merge 수행

😀실습 4-8. 깃허브 확인하기



✔️ merge 수행 완료 후 해당 브랜치 삭제(권장)

✔️ 병합된 파일 내용 확인하기

5. Github Actions

1) 스프링 프로젝트 생성 및 작업

😀실습 1-1. 스프링 프로젝트 생성하기

구분	항목	설명
프로젝트 정보	Name	spring-github-actions-app
	Location	~\Desktop\Workspace
	Type	Gradle-Groovy
	Group	kr.chhak
의존성	Developer Tools	- Spring Boot DevTools - Lombok
	Web	Spring Web

😀실습 1-2. 스프링 프로젝트 작업하기

src > main > resources > application.properties

```
spring.application.name=spring-github-action-app
app.version=0.0.1
```

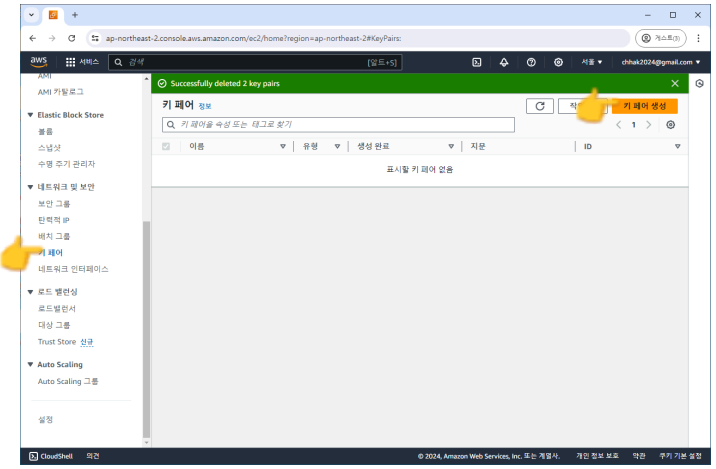
src > main > java > package > SpringGithubActionsAppApplication.java

```
@RestController
@SpringBootApplication
public class SpringGithubActionAppApplication {

    @Value("${spring.application.name}")
    private String appName;

    @Value("${app.version}")
    private String appVersion;

    public static void main(String[] args) {
        SpringApplication.run(SpringGithubAppApplication.class, args);
    }

    @GetMapping("/")
    public String index(){
        return appName+"-"+appVersion;
    }
}
```

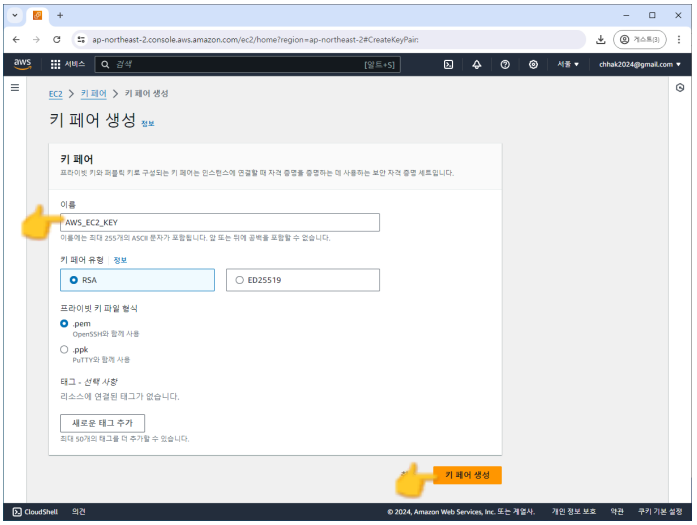
✔️ http://localhost:8080 확인

2) AWS 비밀키 생성 및 설정

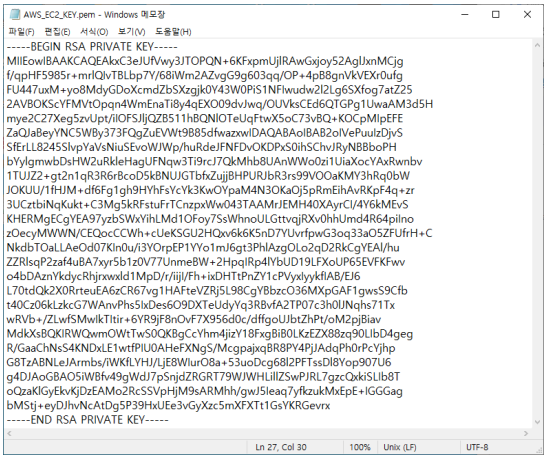
😀실습 2-1. 비밀키 생성하기



✔️ 네트워크 및 보안 > 키 페어
✔️ 키 페어 생성 클릭



✔️ AWS_EC2_KEY 입력
✔️ RSA 선택
✔️ pem 선택
✔️ pem 파일 다운로드



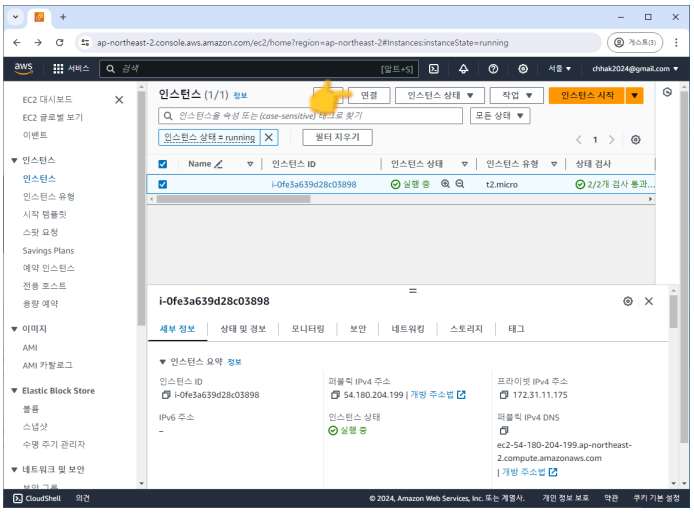
✔️ pem 파일 메모장 열기
✔️ pem 파일 내용 복사

😀실습 2-2. 공개키 생성하기

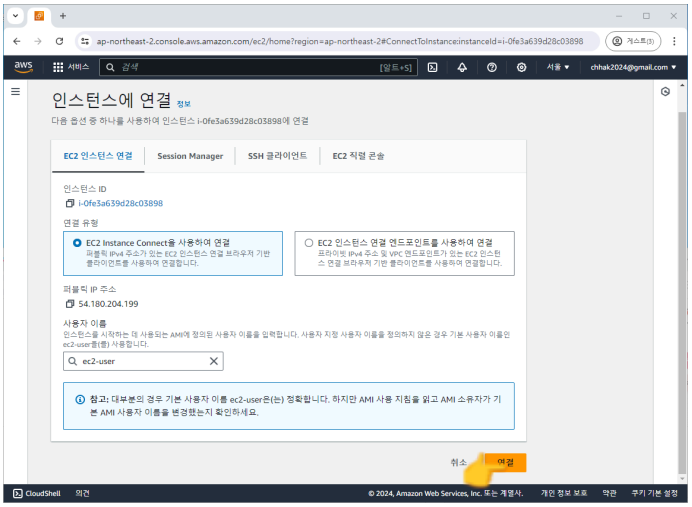
```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Downloads
$ ssh-keygen -f AWS_EC2_KEY.pem -y
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCTELd4lR9XDLclM49A37ooXGmZSOVEDAbGOjLnYCCUnGcwK
Ab2DrTeqr84/7ikHyCdWRURevS5+AVTjju7Ez7Kjwx3IYOhdyZ1ltJfOCOTRjjdbQ+JLU0UjC53Da
XYuDpJd+Rc7T128nCr85RWSwIR3pBMY+DVTBoAzd3kebJ7YLbtd6DnO9Sm3+Ig4VImWNBkHnXWEFA
2U5N5SoW3BfmgLveRVa30Hzl1/BrPH
```

✔️ 공개키 내용 복사하기

😀실습 2-3. AWS EC2 공개키 설정하기



✔️ 인스턴스 선택 후 연결 클릭



✔️ 연결 클릭

😀실습 2-4. 공개키 입력하기

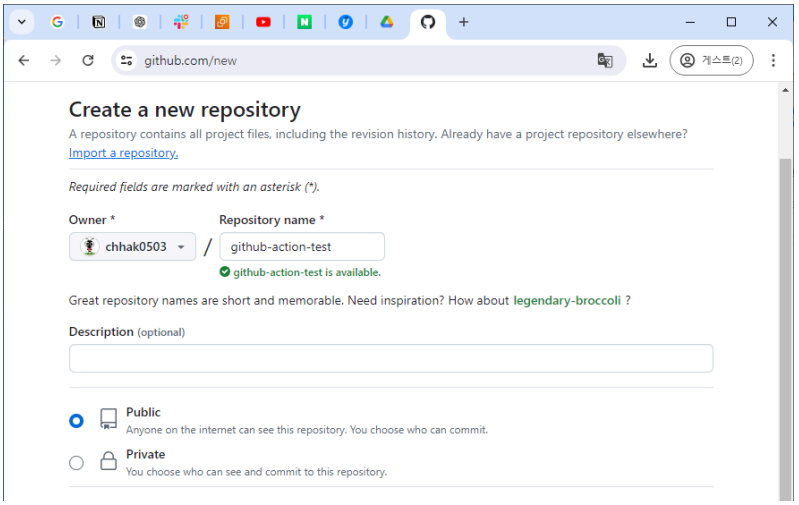
```
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
[ec2-user@ip-172-31-37-192 ~]$ vi .ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCTELd4lR9XDLclM49A37ooXGmZSOVEDAbGOjLnYCCUnGc
wKAb2DrTeqr84/7ikHyCdWRURevS5+AVTjju7Ez7Kjwx3IYOhdyZ1ltJfOCOTRjjdbQ+JLU0UjC53DaXYuD
pJd+Rc7T128nCr85RWSwIR3pBMY+DVTBoAzd3kebJ7YLbtd6DnO9Sm3+Ig4VImWNBkHnXWEFA2U5N5SoW3B
fmgLveRVa30Hzl1/BrPH
```

✔️ 실습 2-2에서 복사한 공개키 내용 그대로 입력하기(붙여넣기)

✔️ ssh-rsa로 시작, 줄바꿈, 띄어쓰기 금지

3) 원격 저장소 생성 및 설정

😀실습 3-1. 원격 저장소 생성하기



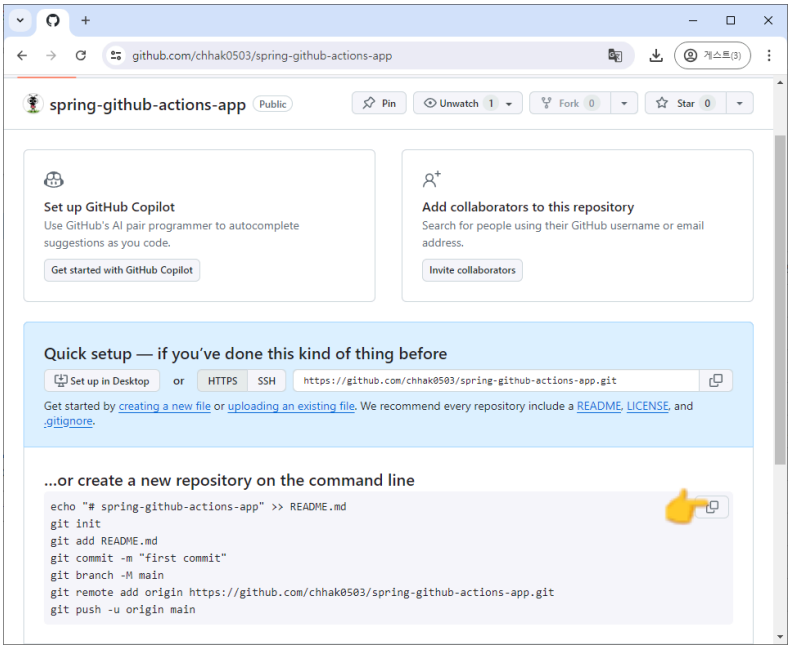
✔️ 저장소 이름 : spring-github-actions-app 입력

✔️ 저장소 공개 : public 선택

✔️ 나머지 설정은 손대지 말것

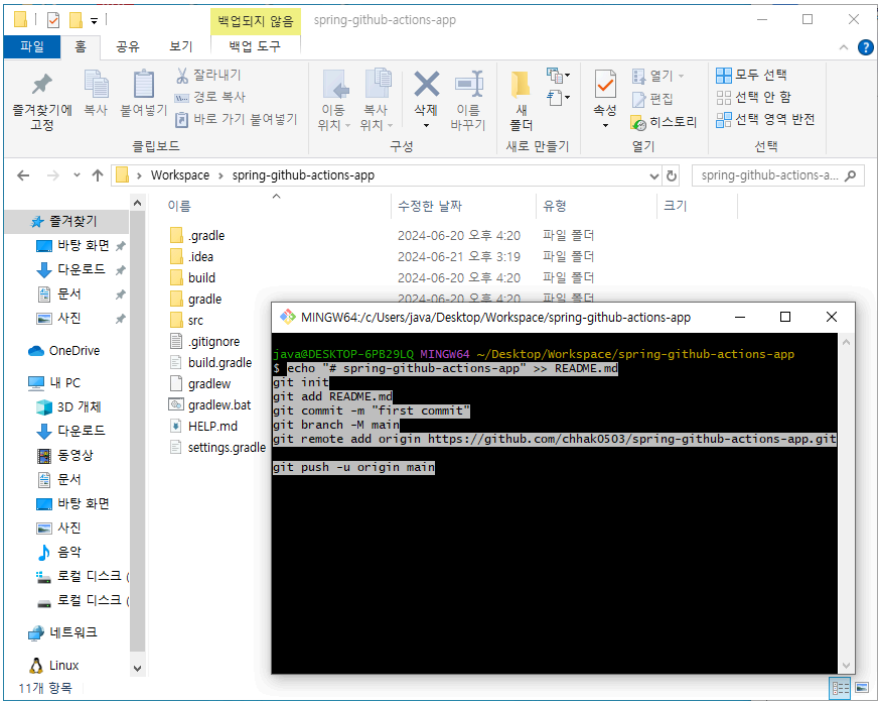
✔️ Create repository 버튼 클릭

😀실습 3-2. 원격 저장소 초기화 코드 복사하기



✔️ …or create a new repository on the command line 코드 복사하기

😀실습 3-3. 원격 저장소 프로젝트 설정하기

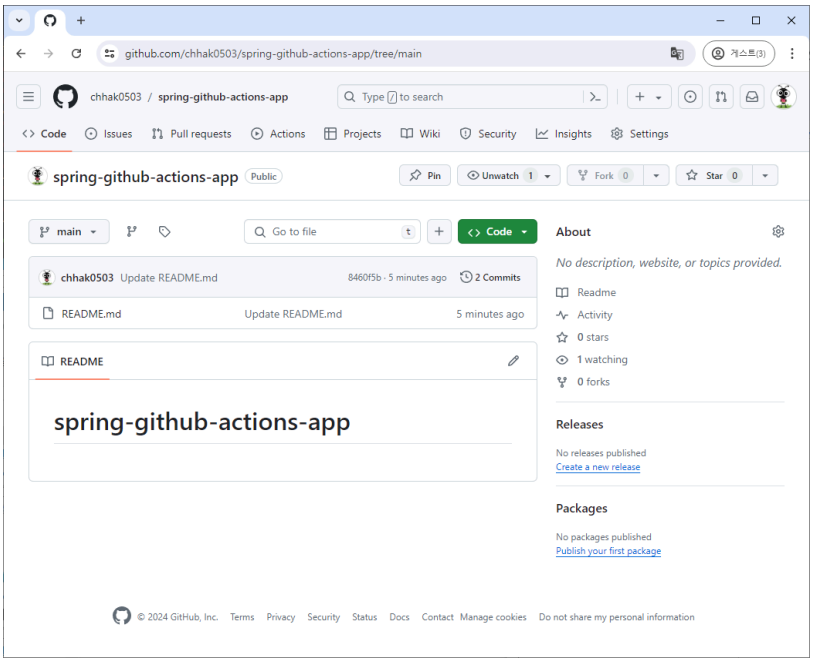


✔️ 프로젝트 폴더 > 마우스 오른버튼 > Open Git Bash here 클릭

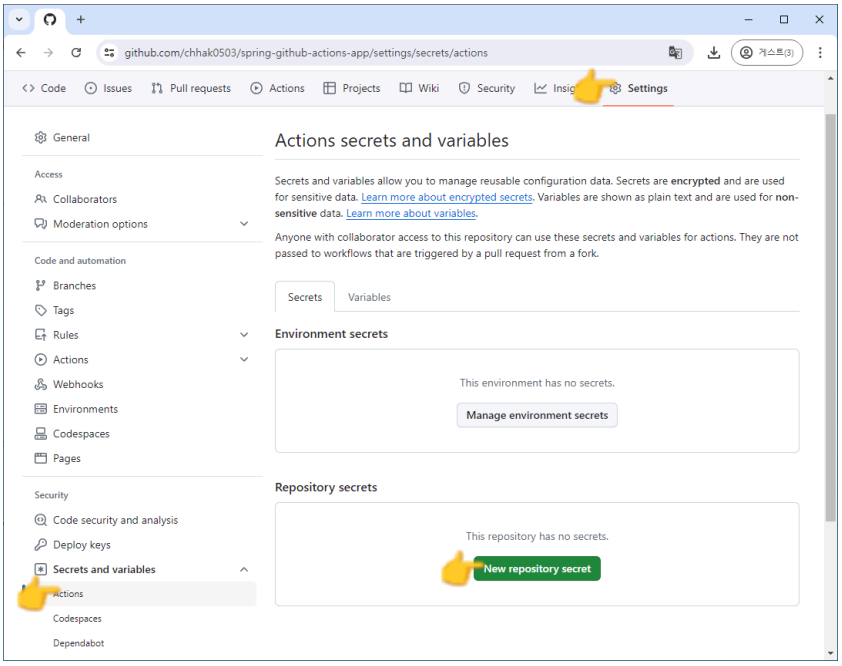
✔️ 원격 저장소 초기화 코드 붙여넣기 후 Enter

✔️ .git 확인

😀실습 3-4. 원격 저장소 확인하기



😀실습 3-5. 저장소 설정하기



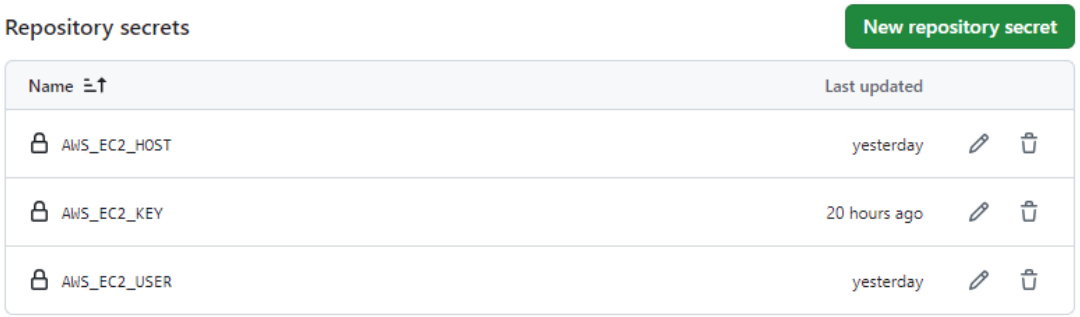
✔️ 저장소 > Settings 클릭

✔️ 사이드 메뉴 > Secrets and variables > Actions 클릭

✔️ New repository secret 버튼 클릭

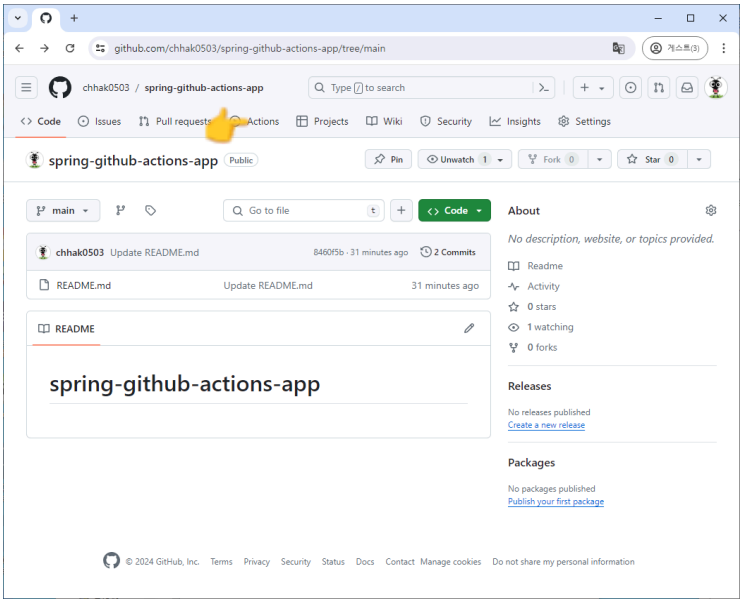
😀실습 3-6. Github Secrets 환경변수 입력하기

Name	Secret	설명
AWS_EC2_HOST	xxx.xxx.xxx.xxx	EC2 서버 아이피 주소 입력
AWS_EC2_USER	ec2-user	EC2 서버 기본 사용자 입력
AWS_EC2_KEY	EC2 secret 내용	실습 2-1 비밀키 내용 입력

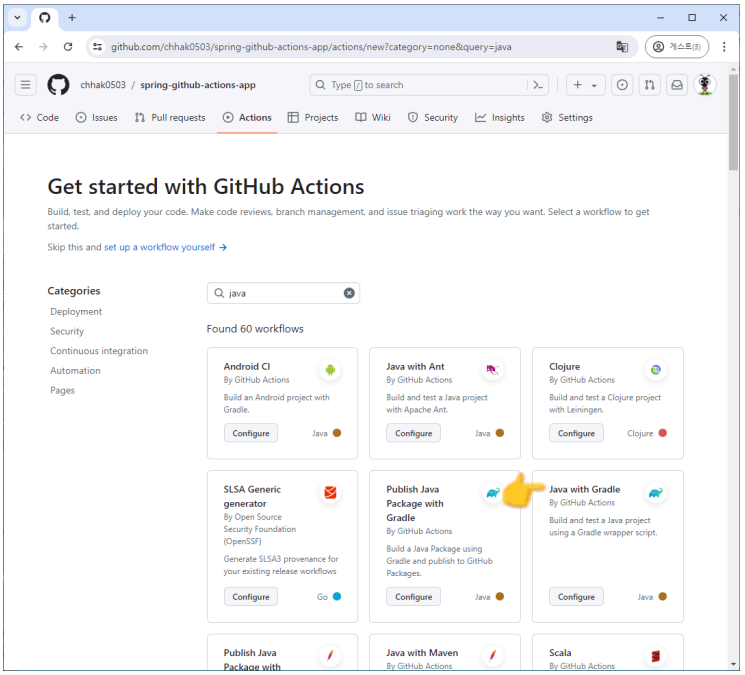


4) Github Actions 실습

😀실습 4-1. 워크 플로우 생성하기

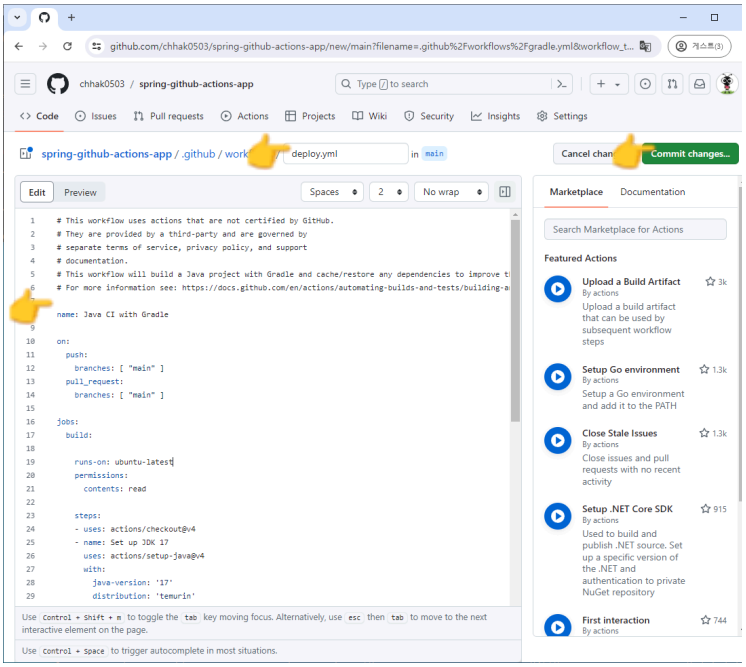


✔️ Actions 메뉴 클릭



✔️ ‘java’ 검색 후 ‘Java with Gradle’ Configure 클릭

😀실습 4-2. Workflow 작성하기



✔️ 파일명 cicd.yml 입력

cicd.yml

https://github.com/chhak0503/git-study/blob/master/ch05/cicd.yml

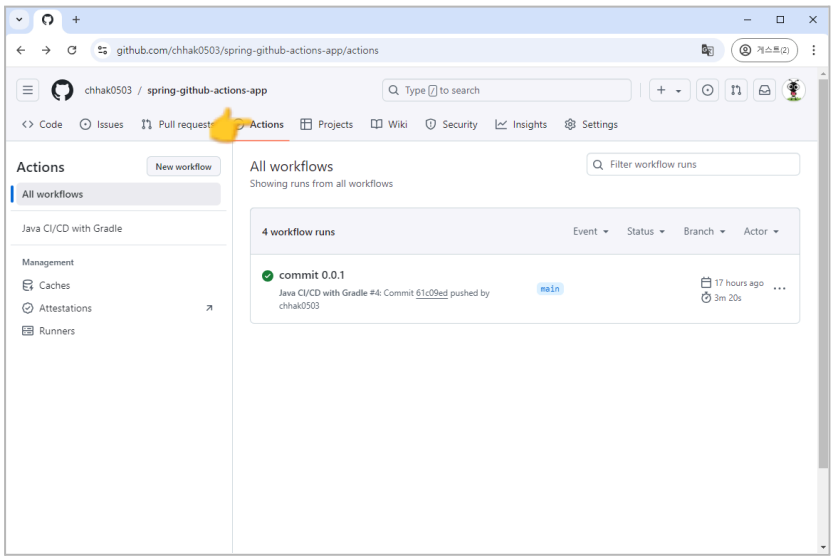
✔️ 기존 내용 삭제 후 위 주소의 스크립트 내용 복사&붙여넣기

✔️ 내용 입력 후 Commit changes… 클릭

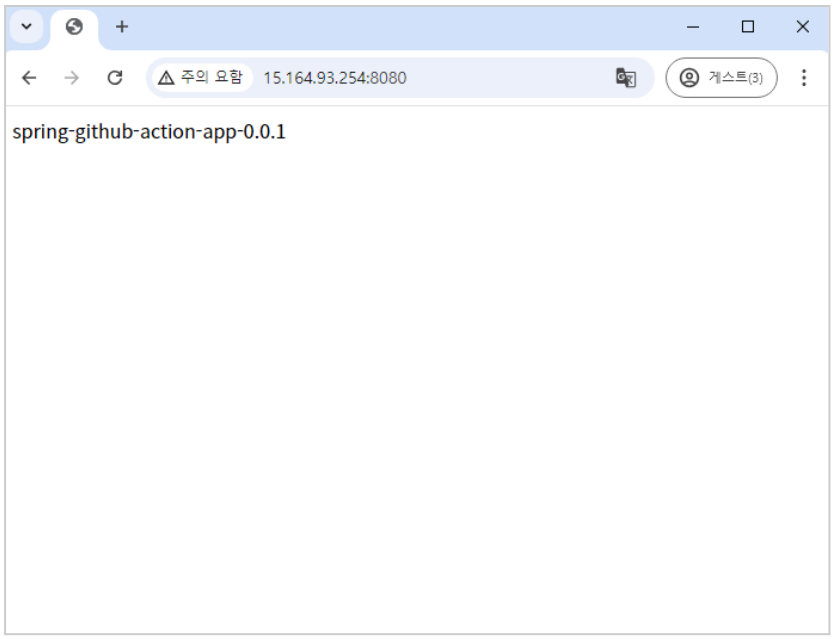
😀실습 4-3. 프로젝트 pull & push 하기

```
chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/spring-github-actions-app (main)
$ git pull

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/spring-github-actions-app (main)
$ git add .

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/spring-github-actions-app (main)
$ git commit -m 'commit 0.0.1'

chhak@DESKTOP-J3DSA4P MINGW64 ~/Desktop/Workspace/spring-github-actions-app (main)
$ git push
```

😀실습 4-4. Github Actions 확인하기



✔️ Github > Actions 클릭, 진행 상태 확인



✔️ Github Actions 진행 완료 후 브라우저 확인