INDEX

1. Git and GitbHub

Git is a version control system that allows you to track changes to your files and collaborate with others. It is used to manage the history of your code and to merge changes from different branches. I can understand that as of now these terms like version control, branches, and merges are not familiar to you.

1.1. Git and Github are different

Git is a version control system that is used to track changes to your files. It is a free and open-source software that is available for Windows, macOS, and Linux. Remember, GIT is a software and can be installed on your computer.

Github is a web-based hosting service for Git repositories. Github is an online platform that allows you to store and share your code with others. It is a popular platform for developers to collaborate on projects and to share code. It is not that Github is the only provider of Git repositories, but it is one of the most popular ones.

ID and PASS

> surajpatel9390@gmail.com
> SURAj2004@

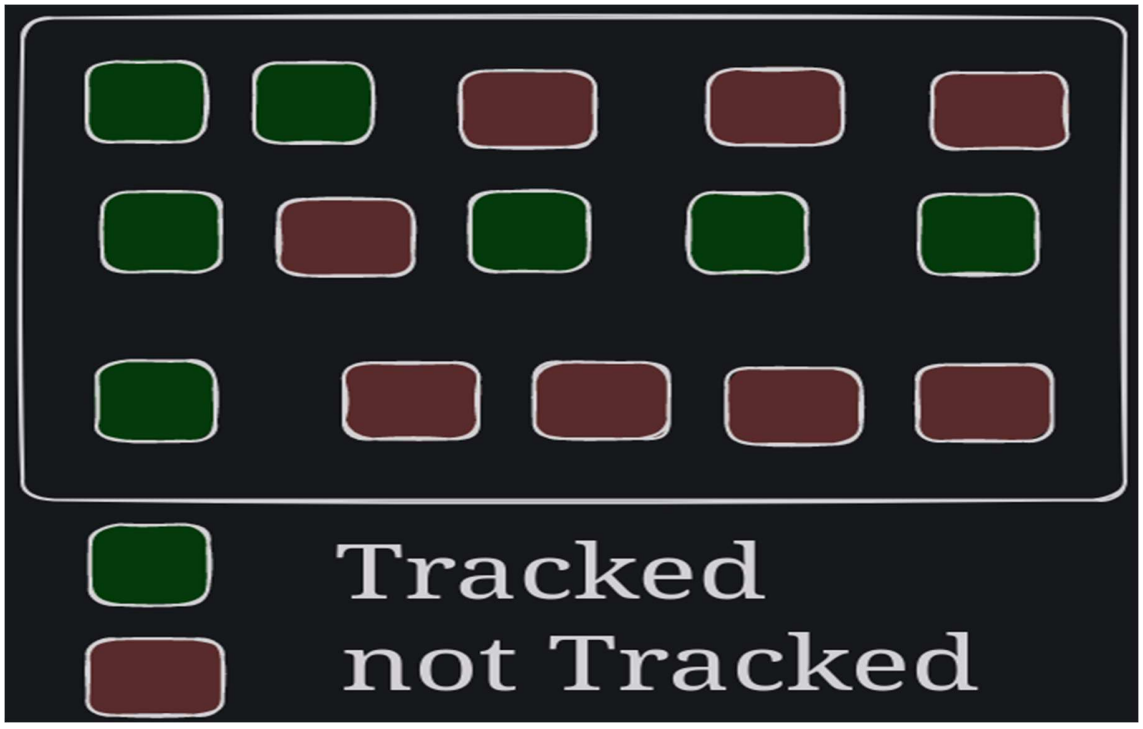
2. Terminology

2.1. Repository

A repository is a collection of files and directories that are stored together. It is a way to store and manage your code. A repository is like a folder on your computer, but it is more than just a folder. It can contain other files, folders, and even other repositories. You can think of a repository as a container that holds all your code.

There is a difference between a software on your system vs tracking a particular folder on your system. At any point you can run the following command to see the current state of your repository:

git status



Not all folders are meant to be tracked by git. Here we can see that all green folders are projects are getting tracked by git but red ones are not.

2.2. Your config settings

Github has a lot of settings that you can change. You can change your username, email, and other settings. Whenever you checkpoint your changes, git will add some information about your such as your username and email to the commit. There is a git config file that stores all the settings that you have changed. You can make settings like what editor you would like to use etc. There are some global settings and some repository specific settings.

Let's setup your email and username in this config file.

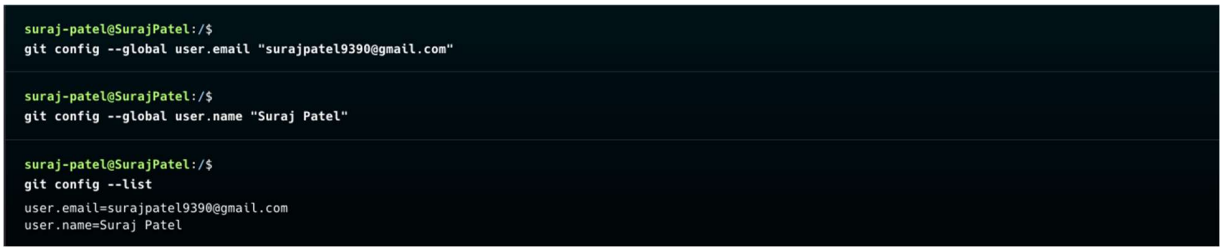
```
git config --global user.email "your-email@example.com"
git config --global user.name "Your Name"
```

Now you can check your config settings:

```
git config --list
```

This will show you all the settings that you have changed.

Example:



2.3. Creating a repository

For creating repository first you need to check the status if you get it like this

git status

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git status
fatal: not a git repository (or any of the parent directories): .git
```

fatal: not a git repository (or any of the parent directories): .git

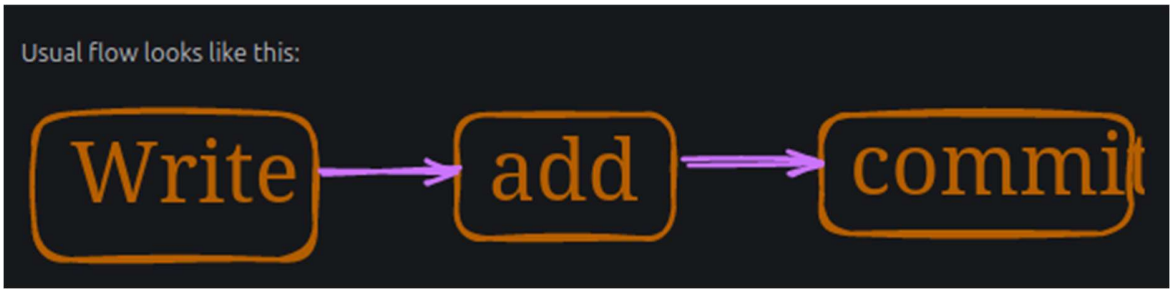
then creating repository

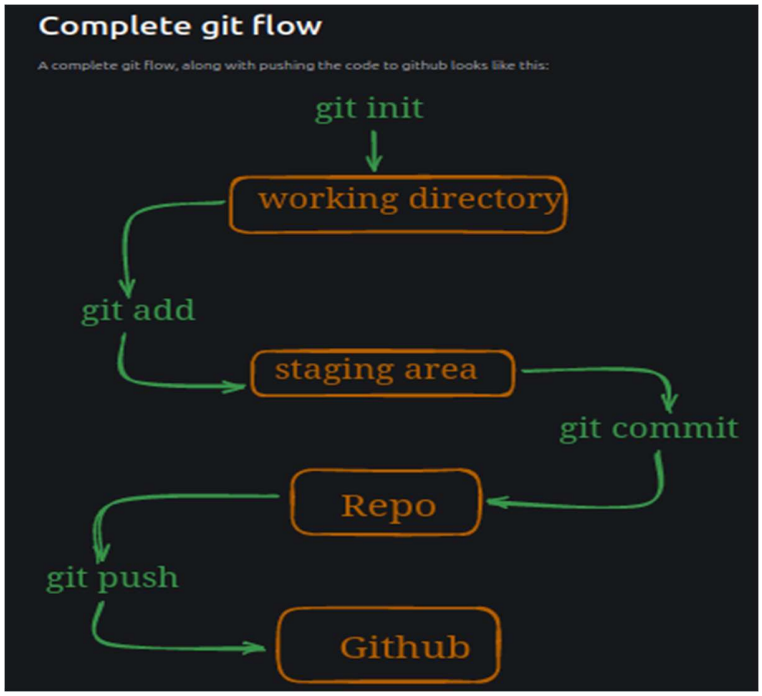
git init is used to create repository

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git init
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint:   git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint:   git branch -m <name>
Initialized empty Git repository in /home/suraj-patel/Desktop/Git_Course/One/.git/
```

2.4. Commit Way

commit is a way to save your changes to your repository.





2.5. Stage

Stage is a way to tell git to track a particular file or folder. You can use the following command to stage a file:

```
git init
git add <file> <file2>
git status
```

Here we are initializing the repository and adding a file to the repository. Then we can see that the file is now being tracked by git. Currently our files are in staging area, this means that we have not yet committed the changes but are ready to be committed.

Here git add <file1> <file2> to add is used to stage a file to commit it

Or other way

git add . To add all file

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git add .
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   file1.txt
        new file:   file2.txt
```

And for remove a file you need to write code git rm –cached<file>…” to unstage

2.6. Commit

```
git commit -m "commit message"
git status
```

Here we are committing the changes to the repository. We can see that the changes are now committed to the repository. The -m flag is used to add a message to the commit. This message is a short description of the changes that were made. You can use this message to remember what the changes were. Missing the -m flag will result in an action that opens your default settings editor, which is usually VIM. We will change this to vscode in the next section.

Example

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git commit -m "first time commit"
[master (root-commit) 5690072] first time commit
 2 files changed, 2 insertions(+)
 create mode 100644 file1.txt
 create mode 100644 file2.txt
```

Now in the file1 we added something and now checking with status

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   file1.txt

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

Now we commit file1 only to save in git

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git add file1.txt
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   file1.txt

suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git commit -m "something is addes in file1"
[master aaf74c1] something is addes in file1
 1 file changed, 2 insertions(+), 1 deletion(-)
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git status
On branch master
nothing to commit, working tree clean
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$
```

2.6. Logs

```
git log
```

This command will show you the history of your repository. It will show you all the commits that were made to the repository. You can use the --oneline flag to show only the commit message. This will make the output more compact and easier to read.

Example

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git log
commit aaf74c1606983dc7c13ed5d7eff3020d0f1b3dd4 (HEAD -> master)
Author: Suraj Patel <surajpatel9390@gmail.com>
Date:   Mon Jun 10 17:48:54 2024 +0530

    something is addes in file1

commit 5690072b1997791503ebeb2cf4e0234fce17e041
Author: Suraj Patel <surajpatel9390@gmail.com>
Date:   Mon Jun 10 16:36:13 2024 +0530

    first time commit
```

Now using oneline command to show log

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git log --oneline
aaf74c1 (HEAD -> master) something is addes in file1
5690072 first time commit
```

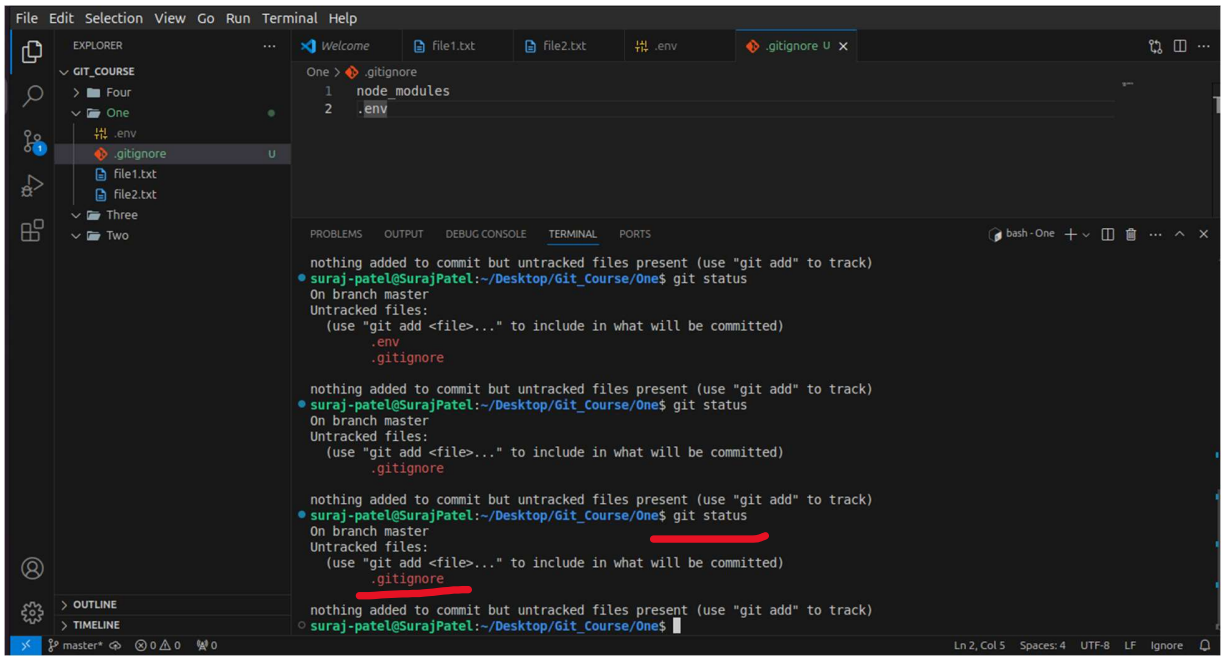
2.7. Gitignore

Gitignore is a file that tells git which files and folders to ignore. It is a way to prevent git from tracking certain files or folders. You can create a gitignore file and add list of files and folders to ignore by using the following command:

Example:

```
node_modules
.env
.vscode
```

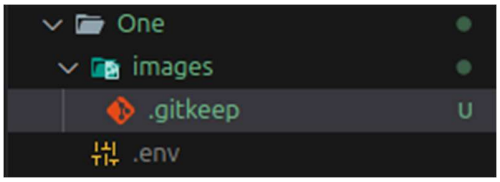
Now, when you run the `git status` command, it will not show the `node_modules` and `.vscode` folders as being tracked by git.



git is ignored the .env file because of .gitignore file

Blank Folder

By defaults blanks folder get ignore by git to keep blank folder we use .gitkeep



3. Branched in git

Branches are a way to work on different versions of a project at the same time. They allow you to create a separate line of development that can be worked on independently of the main branch. This can be useful when you want to make changes to a project without affecting the main branch or when you want to work on a new feature or bug fix.

Some developers can work on Header, some can work on Footer, some can work on Content, and some can work on Layout. This is a good example of how branches can be used in git.

3.1. HEAD in git

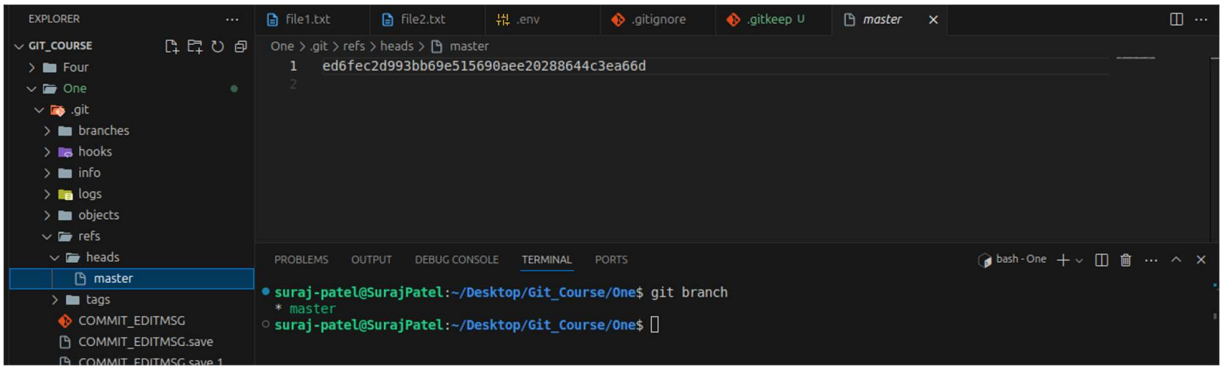
The HEAD is a pointer to the current branch that you are working on. It points to the latest commit in the current branch. When you create a new branch, it is automatically set as the HEAD of that branch.

Creating a new branch

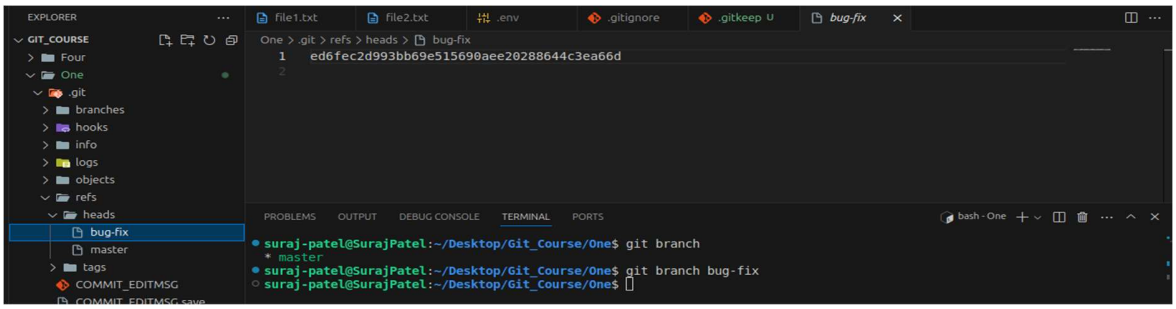
```
git branch
git branch bug-fix
git switch bug-fix
git log
git switch master
git switch -c dark-mode
git checkout orange-mode
```

Some points to note:

- git branch (gives all branch names) - This command lists all the branches in the current repository. Example



- git branch bug-fix(Creating New Branch) - This command creates a new branch called bug-fix. Example:

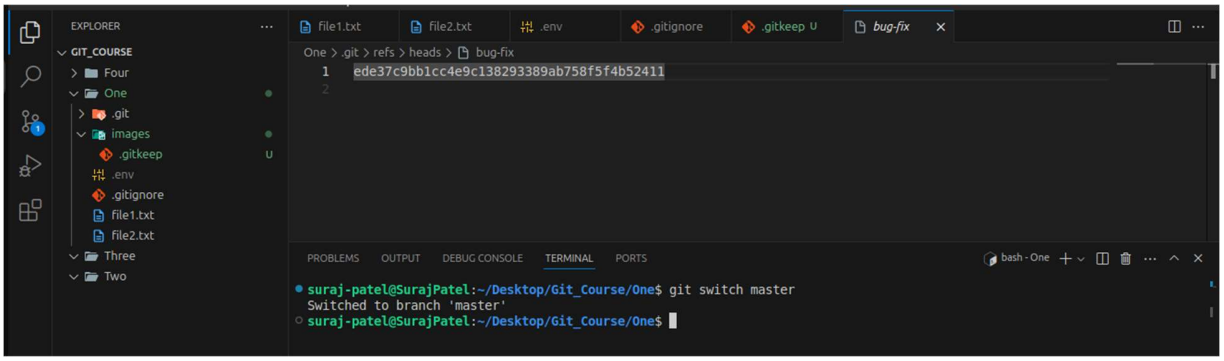


But write now selected branch is master if you want to work on created branch you need to switch the branch

- git switch bug-fix (Switch the branch) - This command switches to the bug-fix branch. Example

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git branch
  * bug-fix
    master
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$
```

- git log - This command shows the commit history for the current branch.
- git switch master (Switch to original path then what happened) - This command switches to the master branch.



BugFix file not showing because this file in another branch and branched name is (bug-fix)

- git switch -c dark-mode (create if exited and switch)- This command creates a new branch called dark-mode. the -c flag is used to create a new branch.

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git switch -c dark_mode
Switched to a new branch 'dark_mode'
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git branch
  bug-fix
* dark_mode
  master
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$
```

It is used to create branch and switch when branch is created and if branch is exited then it only switch

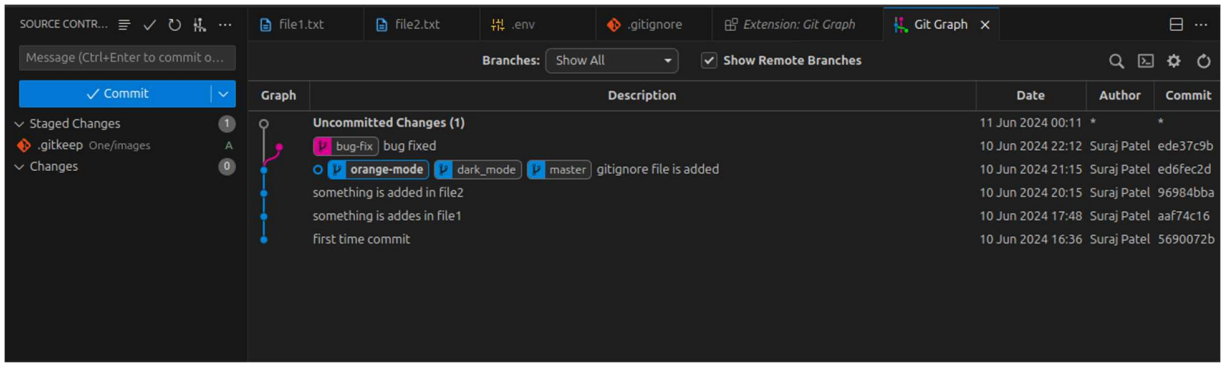
❖ git checkout orange-mode (It is used to switch and most used)- This command switches to the orange-mode branch.

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git checkout orange-mode
error: pathspec 'orange-mode' did not match any file(s) known to git
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git branch orange-mode
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git branch
  bug-fix
* dark_mode
  master
  orange-mode
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git checkout orange-mode
Switched to branch 'orange-mode'
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$
```

It is used to swtich if exited and also tell that if branch is exited or not

- Commit before switching to a branch
- Go to .git folder and checkout to the HEAD file

3.2. Git Graph tool

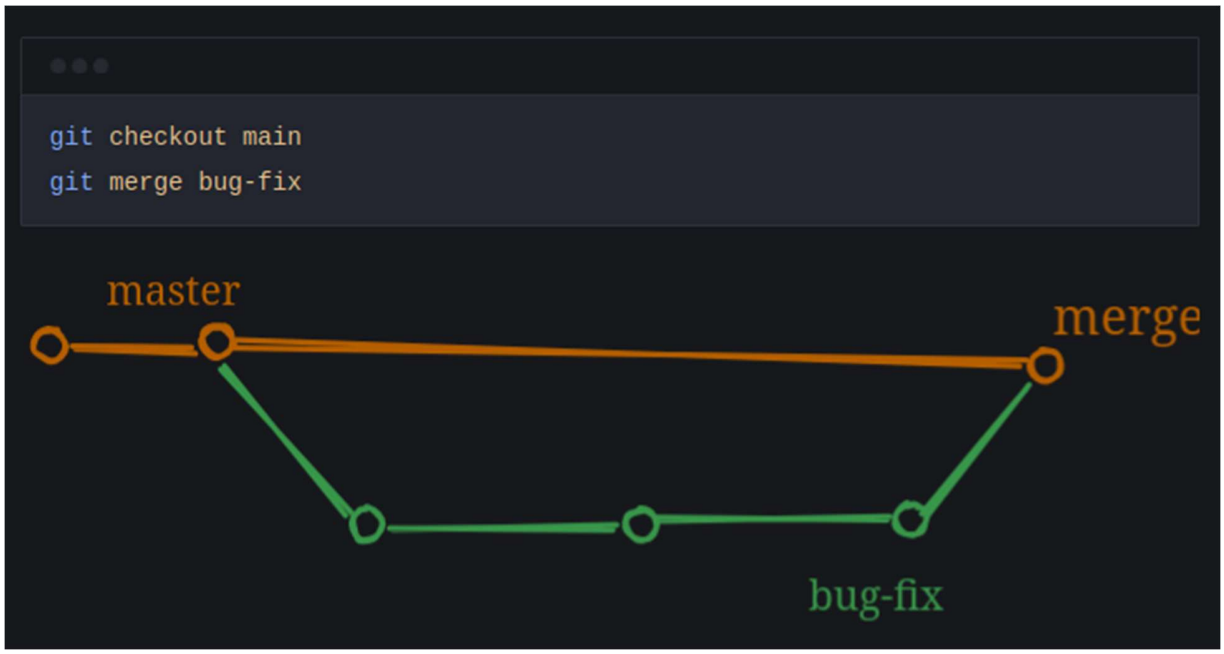


3.3. Merging branches

3.3.1. Fast-forward merge

This one is easy as branch that you are trying to merge is usually ahead and there are no conflicts.

When you are done working on a branch, you can merge it back into the main branch. This is done using the following command:

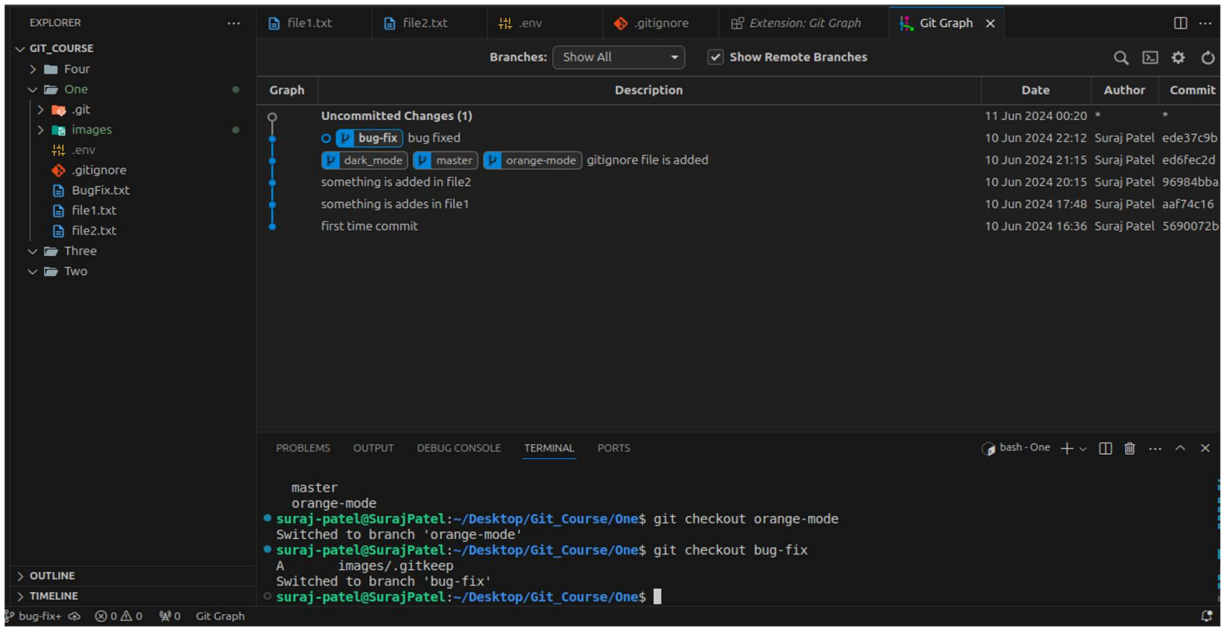


Some points to note:

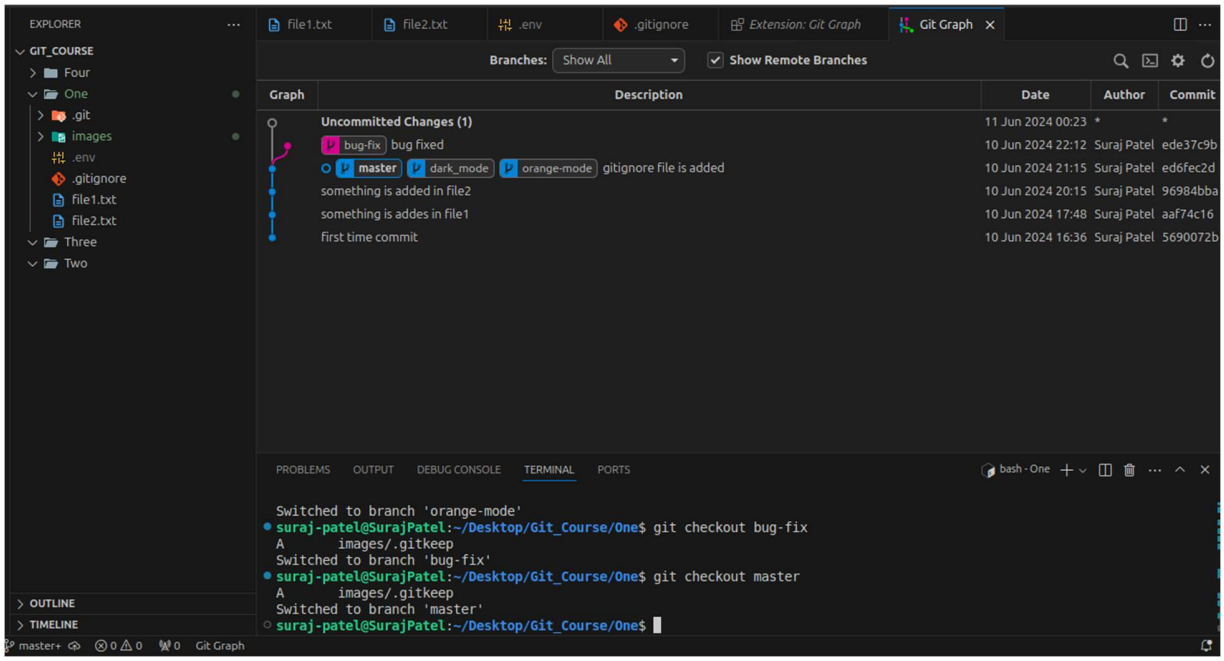
- git checkout main - This command switches to the main branch.
- git merge bug-fix - This command merges the bug-fix branch into the main branch.

This is a fast-forward merge. It means that the commits in the bug-fix branch are directly merged into the main branch. This can be useful when you want to merge a branch that has already been pushed to the remote repository.

Example:

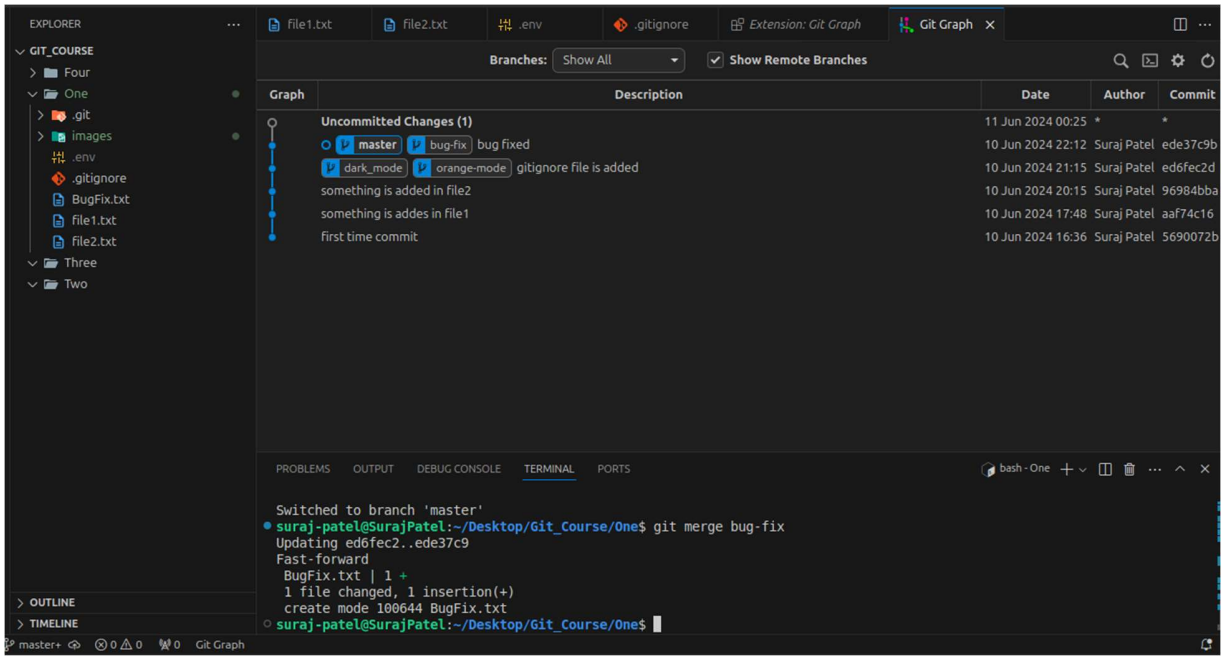


- In branch bug-fix you can see file BugFix but not in master branch(main) see below image



For merge file then BugFix file is also present in master

git merge bug-fix



3.3.2. Not fast-forward merge

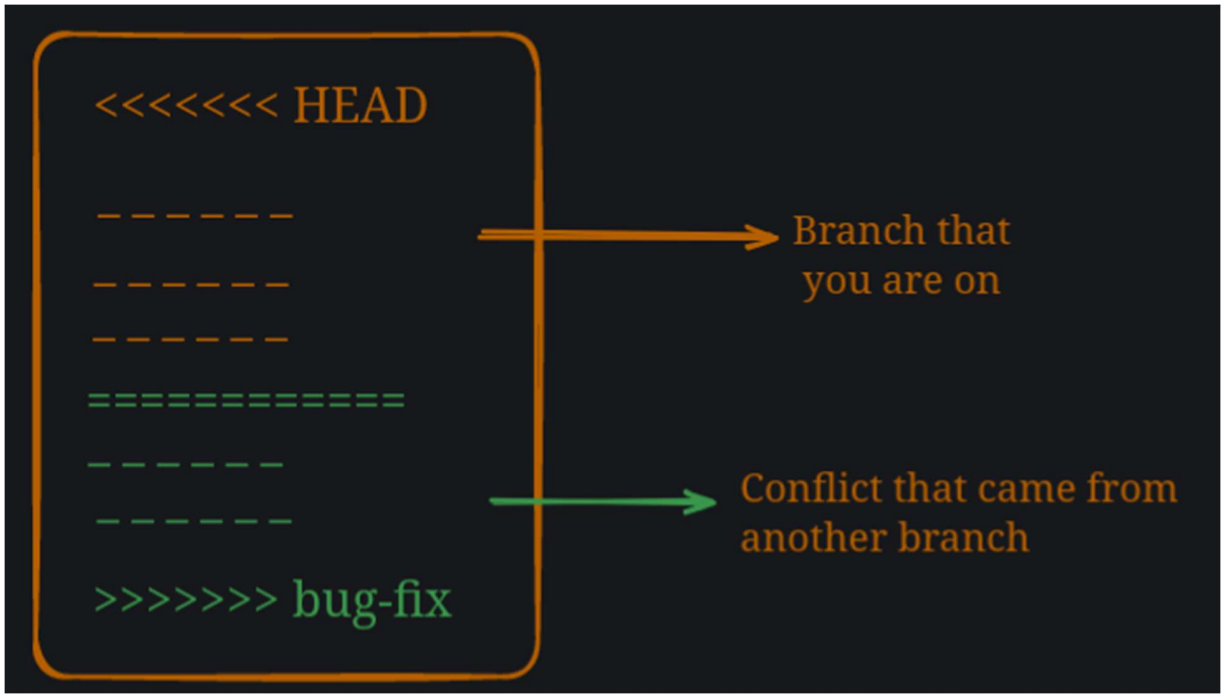
In this type of merge, the master branch also worked and have some commits that are not in the bug-fix branch. This is a not fast-forward merge.

When you are done working on a branch, you can merge it back into the main branch. This is done using the following command:

```
git checkout main
git merge bug-fix
```

If the command are same, what is the difference between fast-forward and not fast-forward merge?

The difference is resolving the conflicts. In a fast-forward merge, there are no conflicts. But in a not fast-forward merge, there are conflicts, and there are no shortcuts to resolve them. You have to manually resolve the conflicts. Decide, what to keep and what to discard. VSCode has a built-in merge tool that can help you resolve the conflicts.

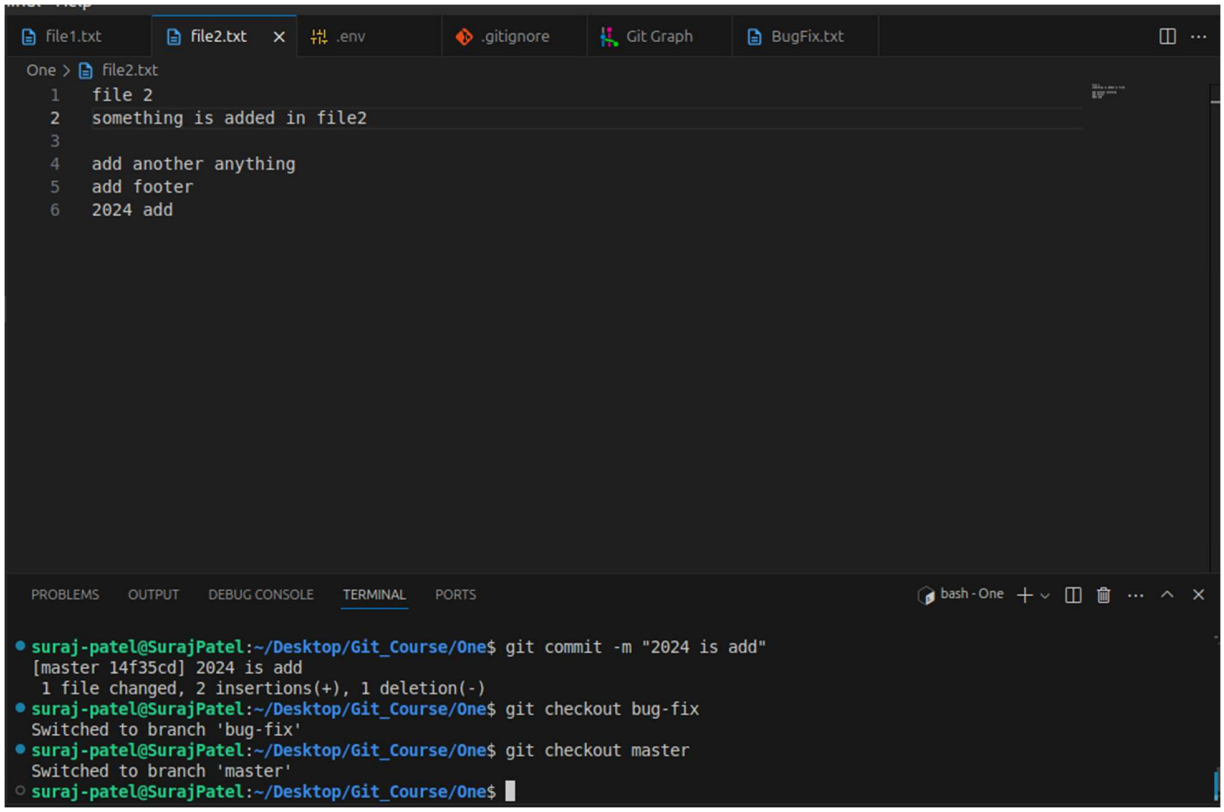


3.4. Managing conflicts

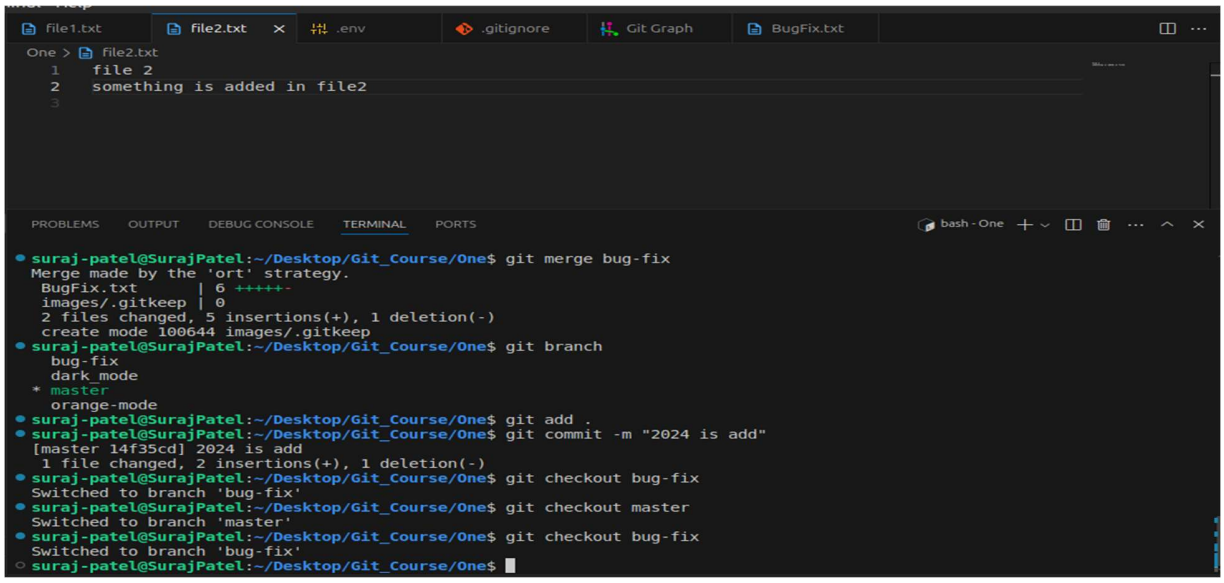
There is no magic button to resolve conflicts. You have to manually resolve the conflicts. Decide, what to keep and what to discard. VSCode has a built-in merge tool that can help you resolve the conflicts. I personally use VSCode merge tool. Github also has a merge tool that can help you resolve the conflicts but most of the time I handle them in VSCode and it gives me all the options to resolve the conflicts.

Overall it sounds scary to beginners but it is not, it's all about communication and understanding the code situation with your team members.

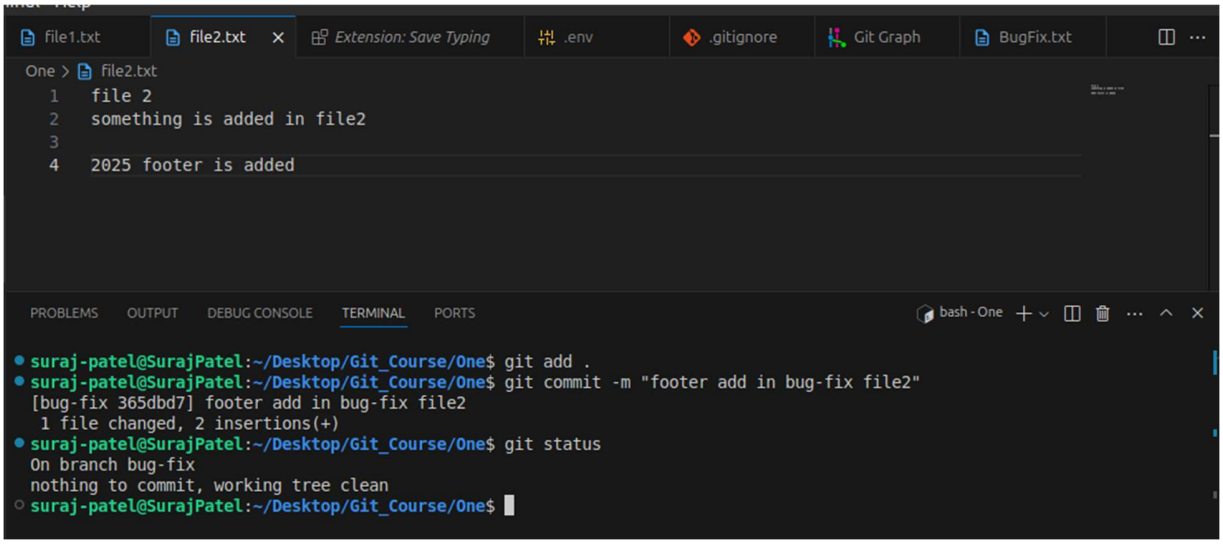
3.5. Conflicts creation and solving



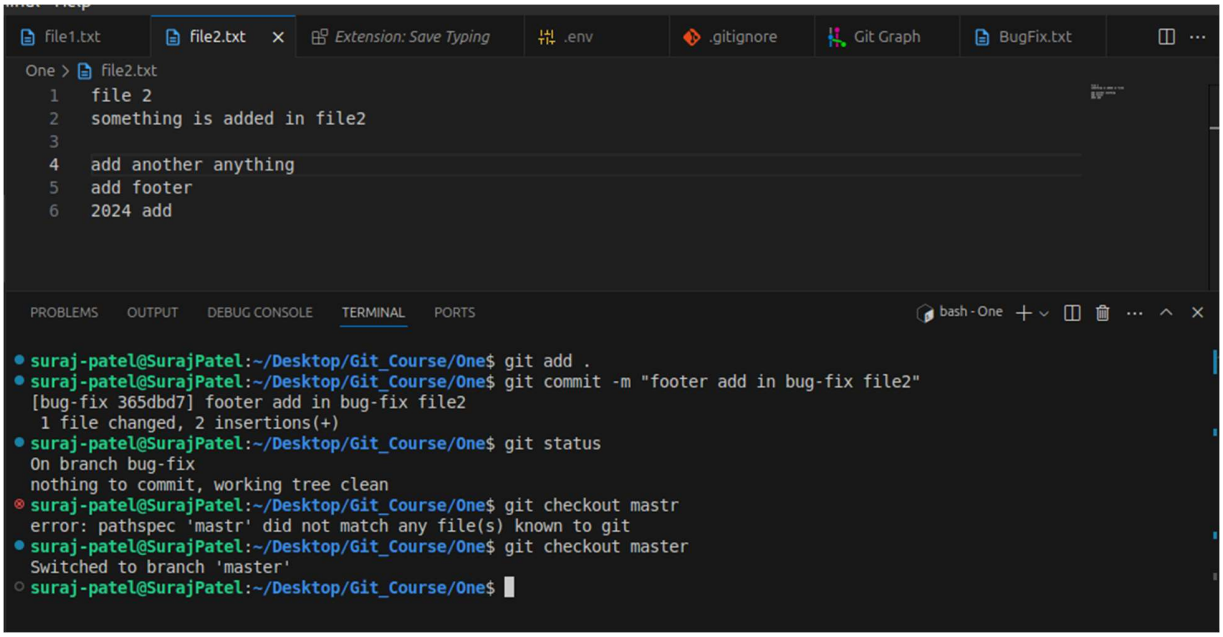
In the file2 there is so much content now switching from master(main) to bug-fix branch



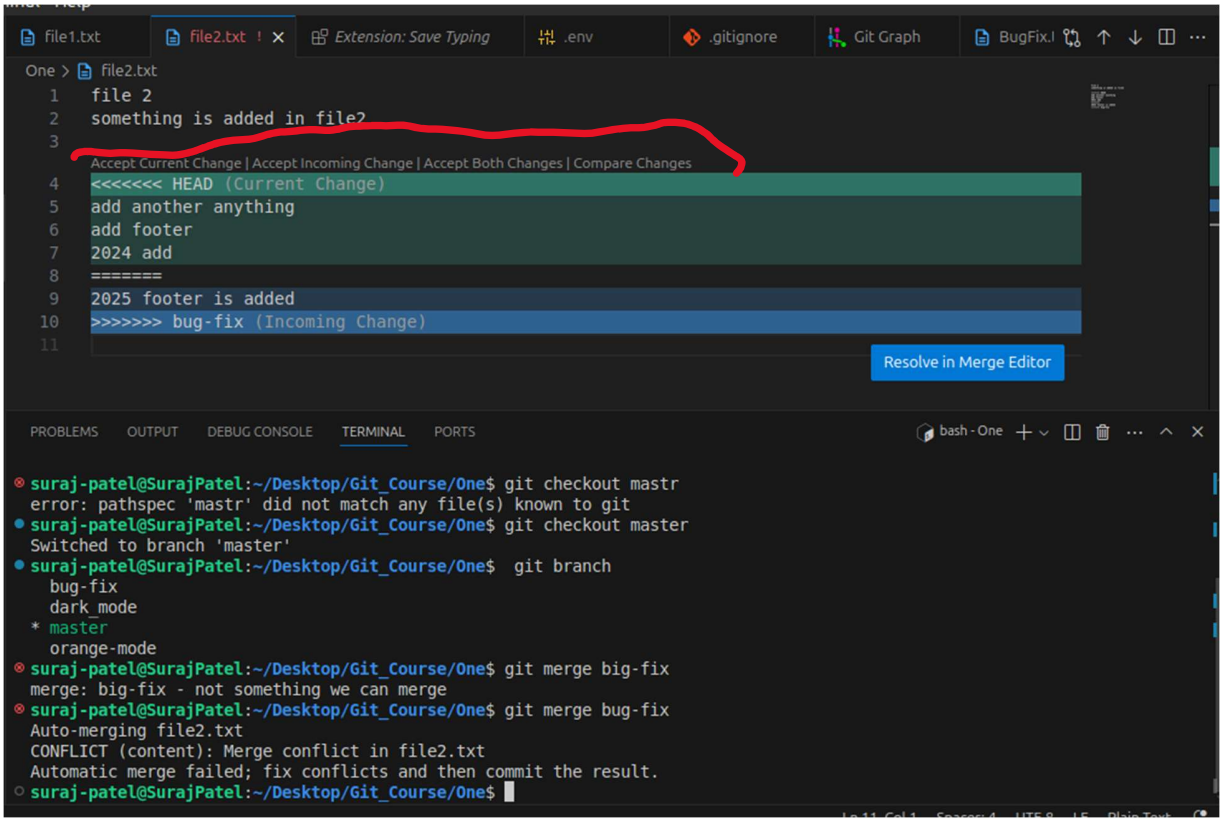
Now we can see that in file2 there is no so much content and now bug-fix added footer also so there is conflict is created



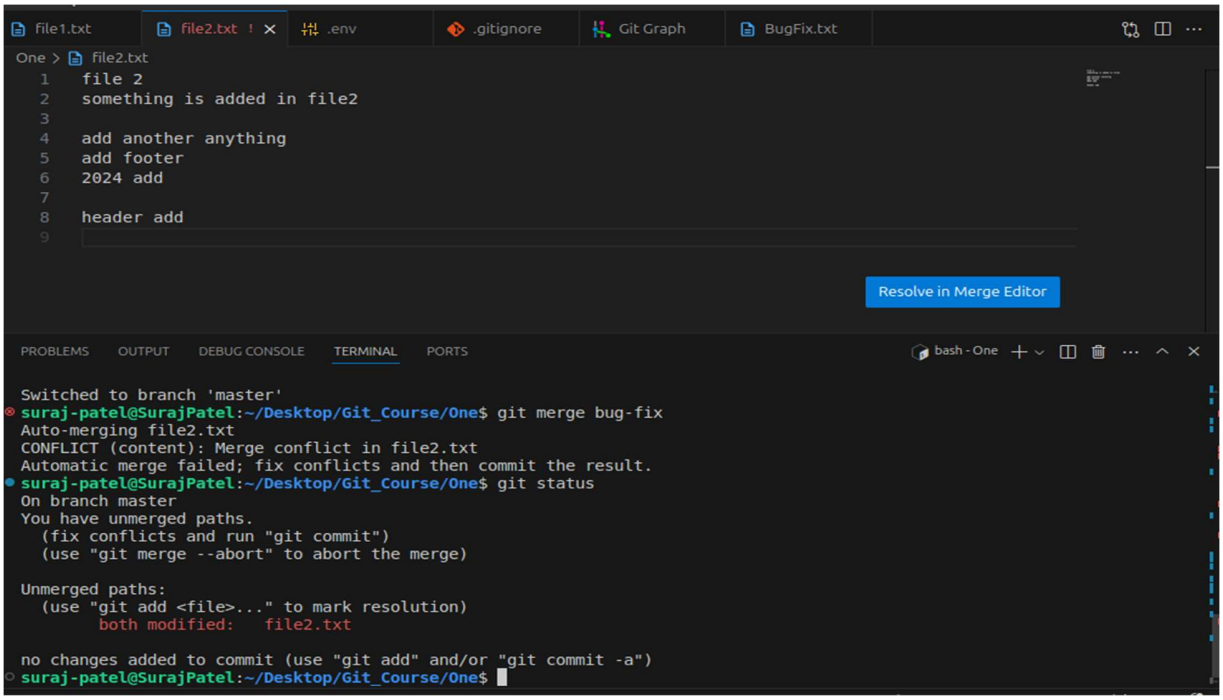
Footer is added not switching to master branch (main branch)



Now you can see there is same file but content is different
If you try merge with this code git merge bug-fix you get this type of window in vscode



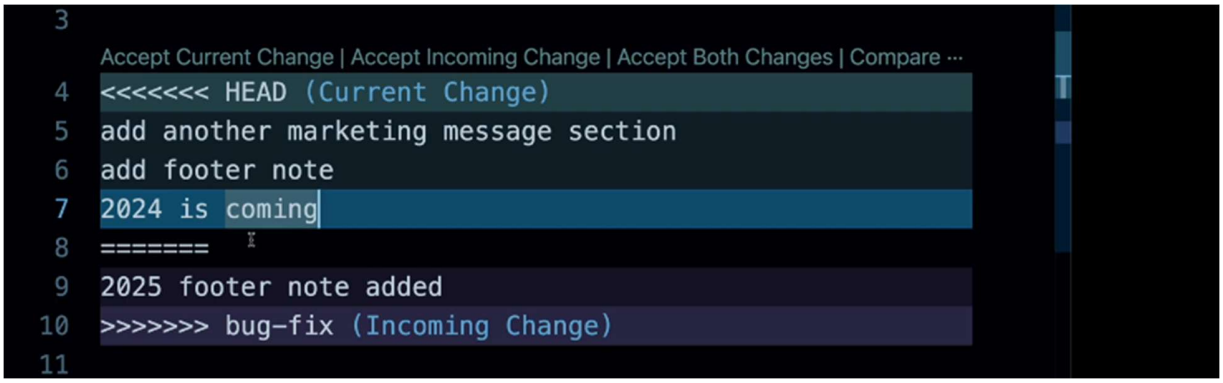
Now, you can select what you want to do from the following options.



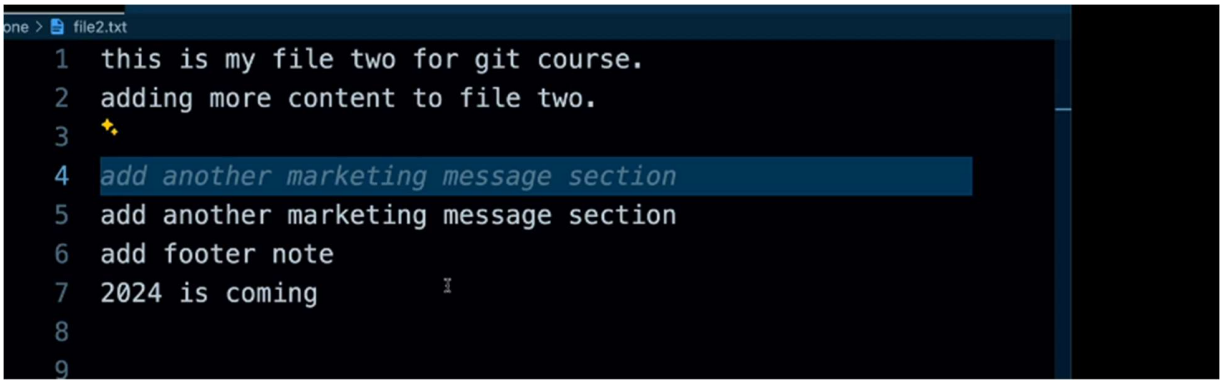
now you need to add file and commit

```
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git add file2.txt
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git commit -m "confilict resolved"
[master e11bf3c] confilict resolved
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$ git status
On branch master
nothing to commit, working tree clean
suraj-patel@SurajPatel:~/Desktop/Git_Course/One$
```

You can also do manually like this



Like this



And now do same thing add and commit

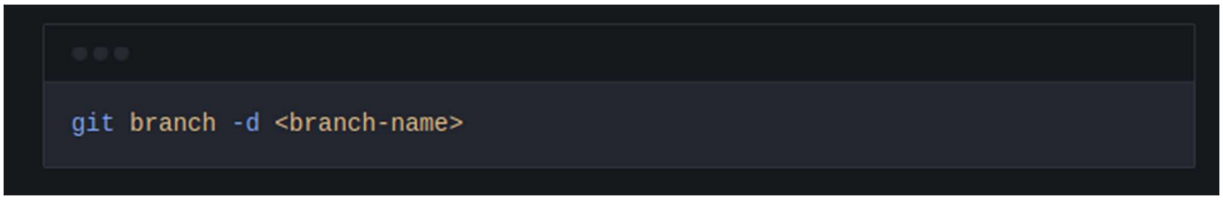
3.6. Rename a branch

You can rename a branch using the following command:

```
git branch -m <old-branch-name> <new-branch-name>
```

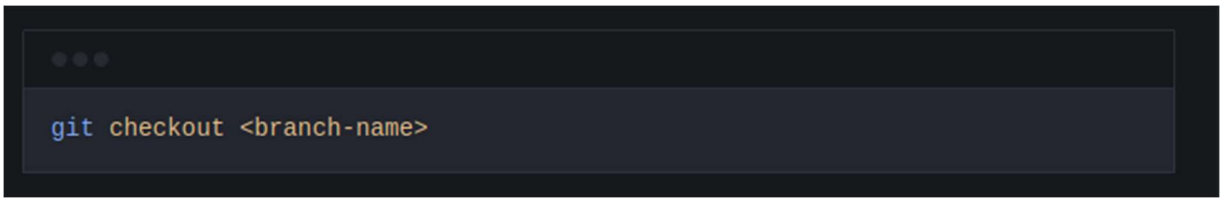
3.7. Delete a branch

You can delete a branch using the following command:



3.8. Checkout a branch

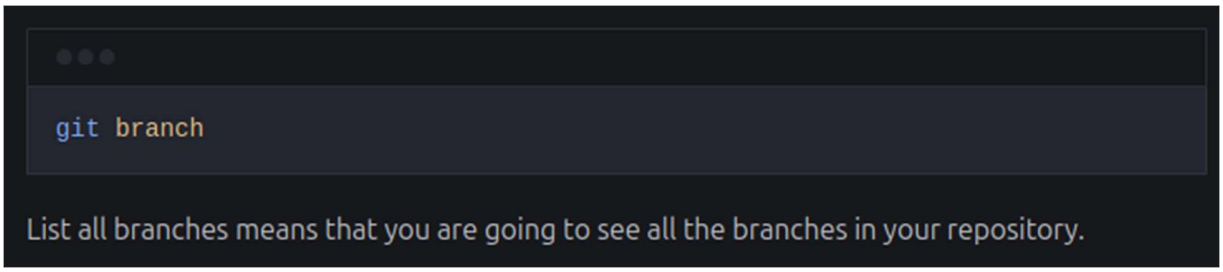
You can checkout a branch using the following command:



Checkout a branch means that you are going to work on that branch. You can checkout any branch you want.

3.9. List all branches

You can list all branches using the following command:



4. diff stash and Tags

4.1. Git diff

The `git diff` is an informative command that shows the differences between two commits. It is used to compare the changes made in one commit with the changes made in another commit. Git consider the changed versions of same file as two different files. Then it gives names to these two files and shows the differences between them.

How to read the diff

- a -> file A and b -> file B
- --- indicates the file A
- +++ indicates the file B
- @@ indicates the line number

Here the file A and file B are the same file but different versions.

Git will show you the changes made in the file A and file B. It will also show you the line number where the change occurred along with little preview of the change.

4.1.1. Comparing Working Directory and Staging Area

```
git diff
```

This command shows the unstaged changes in your working directory compared to the staging area. This command alone will not show you the changes made in the file A and file B, you need to provide options to show the changes.

4.1.2. Comparing Staging Area with Repository

```
git diff --staged
```

This command shows the changes between your last commit and the staging area (i.e., changes that are staged and ready to be committed).

4.1.3. Comparing between branches

```
git diff <branch-name-one> <branch-name-two>
```

This command compares the difference between two branches. For example:

Another way to compare the difference between two branches is to use the following command:

```
git diff branch-name-one..branch-name-two
```

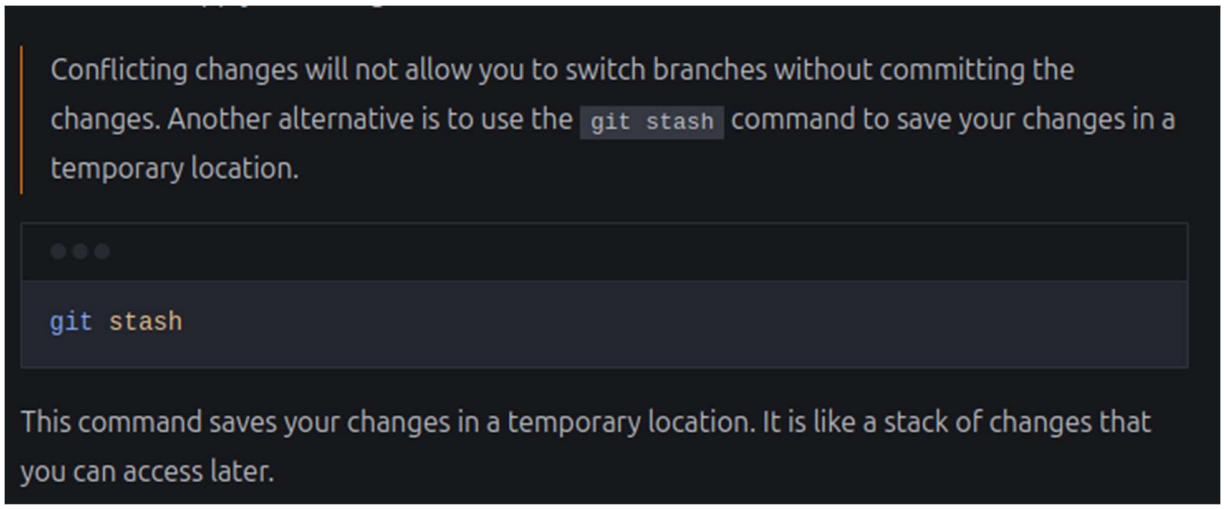
4.1.4. Comparing Specific Commits:

```
git diff <commit-hash-one> <commit-hash-two>
```

This command compares the difference between two commits.

4.2. Git Stash

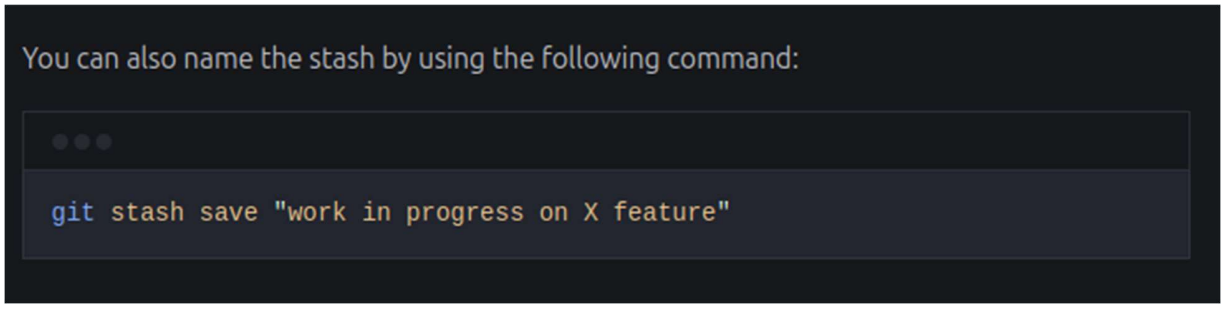
Stash is a way to save your changes in a temporary location. It is useful when you want to make changes to a file but don't want to commit them yet. You can then come back to the file later and apply the changes.



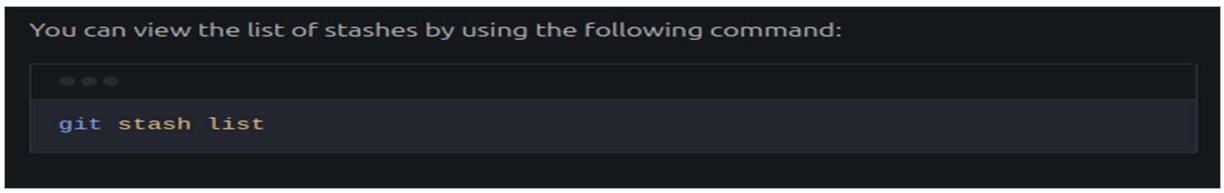
Example:

If you added something in in some file and you want to switch branch then you need to commit first but you want to not commit at that time then we use git stash for temporary save

4.2.1. Naming the stash



4.2.2. View the stash list



4.2.3. Apply the stash

You can apply the stash by using the following command:

```
git stash apply
```

4.2.4. Apply the specific stash

You can apply the specific stash by using the following command:

```
git stash apply stash@{0}
```

Here `stash@{0}` is the name of the stash. You can use the `git stash list` command to get the name of the stash.

4.2.5. Applying and dropping the stash

You can apply and drop the stash by using the following command:

```
git stash pop
```

This command applies the stash and drops it from the stash list.

4.2.6. Drop the stash

You can drop the stash by using the following command:

```
git stash drop
```

4.2.7. Applying stash to a specific branch

You can apply the stash to a specific branch by using the following command:

```
git stash apply stash@{0} <branch-name>
```

4.2.8. Clearing the stash

You can clear the stash by using the following command:

```
git stash clear
```

4.3. Git Tags

Tags are a way to mark a specific point in your repository. They are useful when you want to remember a specific version of your code or when you want to refer to a specific commit. Tags are like sticky notes that you can attach to your commits.

4.3.1. Creating a tag

You can create a tag using the following command:

```
git tag <tag-name>
```

This command creates a new tag with the specified name. The tag will be attached to the current commit.

4.3.2. Create an annotated tag

You can create an annotated tag using the following command:

```
git tag -a <tag-name> -m "Release 1.0"
```

This command creates an annotated tag with the specified name and message. The tag will be attached to the current commit.

4.3.3. List all tags

You can list all tags using the following command:

```
git tag
```

This command lists all the tags in your repository.

4.3.4. Tagging a specific commit

You can tag a specific commit using the following command:

```
git tag <tag-name> <commit-hash>
```

4.3.5. Push tags to remote repository

You can push tags to a remote repository using the following command:

```
git push origin <tag-name>
```

4.3.6. Delete a tag

You can delete a tag using the following command:

```
git tag -d <tag-name>
```

4.3.7. Delete tag on remote repository

You can delete a tag on a remote repository using the following command:

```
git push origin :<tag-name>
```

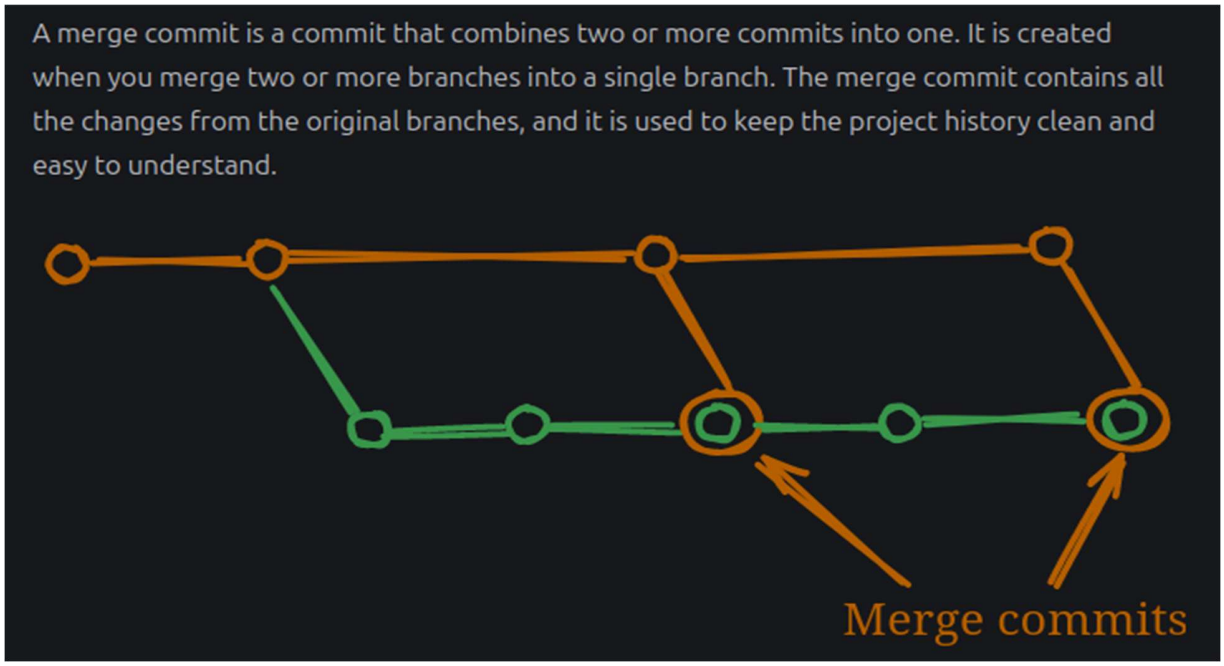
5. Rebase and reflog

5.1. Rebase in git

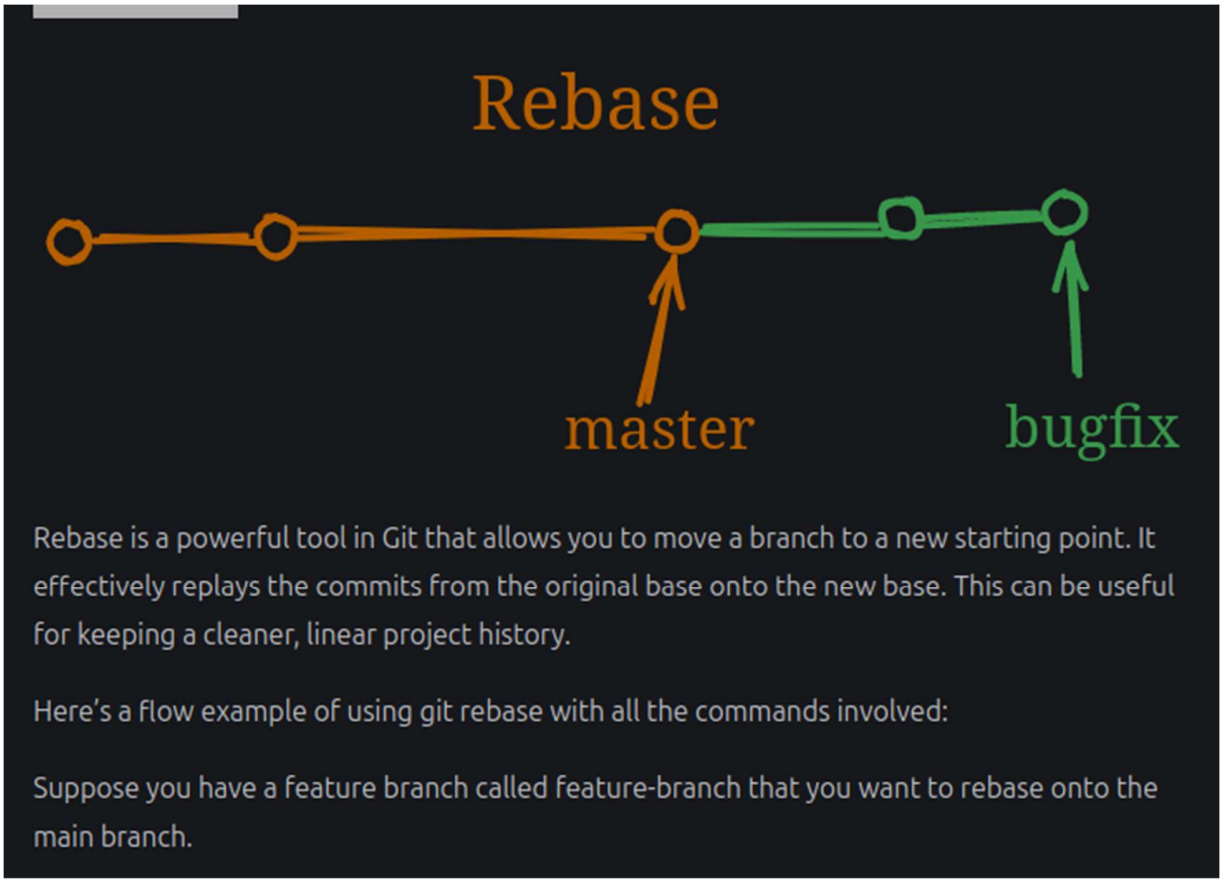
Git rebase is a powerful Git feature used to change the base of a branch. It effectively allows you to move a branch to a new starting point, usually a different commit, by “replaying” the commits from the original base onto the new base. This can be useful for keeping a cleaner, linear project history.

Some people like to use rebase over the merge command because it allows you to keep the commit history cleaner and easier to understand. It also allows you to make changes to the code without affecting the original branch.

5.2. Merge commits



5.3. Rebase



Rebase is a powerful tool in Git that allows you to move a branch to a new starting point. It effectively replays the commits from the original base onto the new base. This can be useful for keeping a cleaner, linear project history.

Here's a flow example of using git rebase with all the commands involved:

Suppose you have a feature branch called feature-branch that you want to rebase onto the main branch.

5.4. Ensure you are on the branch you want to rebase:

```
git checkout feature-branch
git rebase main
```

This will replay the commits from feature-branch on top of the latest changes in main.

5.5. Resolve any conflicts:

If there are any conflicts, you will need to resolve them manually. You can use the merge tool in VSCode to resolve the conflicts.

```
git add <resolved-files>
git rebase --continue
```

> Try to avoid —force option when using rebase. It can cause issues with the project history. I have seen many horror stories of people using —force to fix conflicts.

5.6. Git reflog

Git reflog is a command that shows you the history of your commits. It allows you to see the changes that you have made to your repository over time. This can be useful for debugging and understanding the history of your project.

5.7. View the reflog:

```
git reflog
```

This will show you the history of your commits. You can use the number at the end of each line to access the commit that you want to view.

5.8. Find specific commit

You can find a specific commit using the following command:

```
git reflog <commit-hash>
```

5.9. Recover lost commits or changes

If you accidentally deleted a branch or made changes that are no longer visible in the commit history, you can often recover them using the reflog. First, find the reference to the commit where the branch or changes existed, and then reset your branch to that reference.

```
git reflog <commit-hash>
git reset --hard <commit-hash>
```

or you can use `HEAD@{n}` to reset to the nth commit before the one you want to reset to.

```
git reflog <commit-hash>
git reset --hard HEAD@{1}
```

6. Started with Github

6.1. Configure your config file

If you havn't done it already, you need to configure your git config file. You can do this by running the following command:

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

This will set your email and name as your global settings. You can change these settings later by running the following command:

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

Now you can check your config settings:

```
git config --list
```

This will show you all the settings that you have changed.

6.2. Setup ssh key and add to github

If you haven't done it already, you need to setup ssh key and add it to your github account. You can do this by following the instructions on the Github website.

You can find the exact steps on the website for both Windows and MacOS. The steps are same for both, only apple users need to add the ssh key to their keychain.

6.2.1. Step 1: Generate a new SSH key

To generate a new SSH key, open the terminal and run the following command:

```
ssh-keygen -t ed25519 -C "your-email@chaicode.com"
```

Here ed25519 is the type of key that you are generating. This creates a new SSH key, using the provided email as label.

6.2.2. Save the key

After generating the key, you need to save it to your computer. You can do this by running the following command:

> Enter a file in which to save the key (/Users/YOU/.ssh/id_ALGORITHM): [Press enter]

At the prompt you can enter passphrase for the key or you can leave it blank. If you leave it blank, the key will be saved without a passphrase.

6.2.3. Add key to your ssh-agent

After saving the key, you need to add it to your ssh-agent. You can do this by running the following command:

Here it is best to refer above link for more information, as Github has a lot of information on this. There is no point in repeating it here.

6.2.4. Add key to github

Use the webui to add the key to your github account. You can do this by following the instructions on the Github website.

6.3. Adding code to remote repository

Now that you have setup your ssh key and added it to your github account, you can start pushing your code to the remote repository.

Create a new Repo on your system first, add some code and commit it.

```
git init
git add <files>
git commit -m "commit message"
```

6.3.1. Check remote url setting

You can check the remote url setting by running the following command:

```
git remote -v
```

This will show you the remote url of your repository.

Example after adding remote repository checking and we get this

6.3.2. Add remote repository

You can add a remote repository by running the following command:

```
git remote add origin <remote-url>
```

Here `<remote-url>` is the url of the remote repository that you want to add and origin is the name of the remote repository. This origin is used to refer to the remote repository in the future.

```
git remote add origin https://github.com/hiteshchoudhary/chai-something.git
```

6.3.3. Push code to remote repository

> git push remote-name branch-name

Here `remote-name` is the name of the remote repository that you want to push to and `branch-name` is the name of the branch that you want to push.

```
git push origin main
```

Or use git push –u origin main

6.3.4. Setup an upstream remote

Setting up an upstream remote is useful when you want to keep your local repository up to date with the remote repository. It allows you to fetch and merge changes from the remote repository into your local repository.

To set up an upstream remote, you can use the following command:

```
git remote add upstream <remote-url>
```

or you can use shorthand:

```
git remote add -u <remote-url>
```

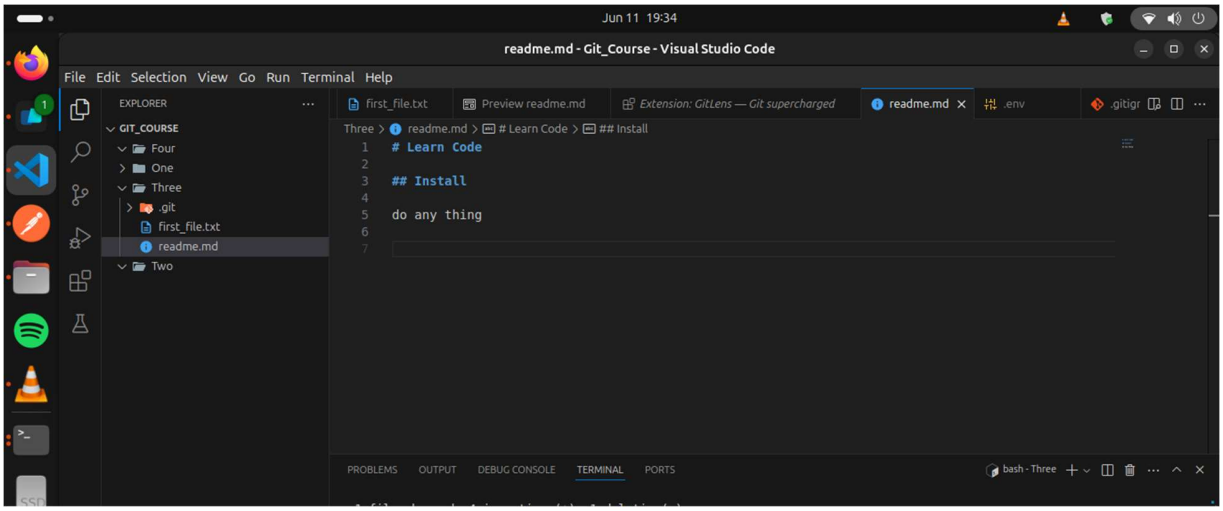
You can do this at the time of pushing your code to the remote repository.

```
git push -u origin main
```

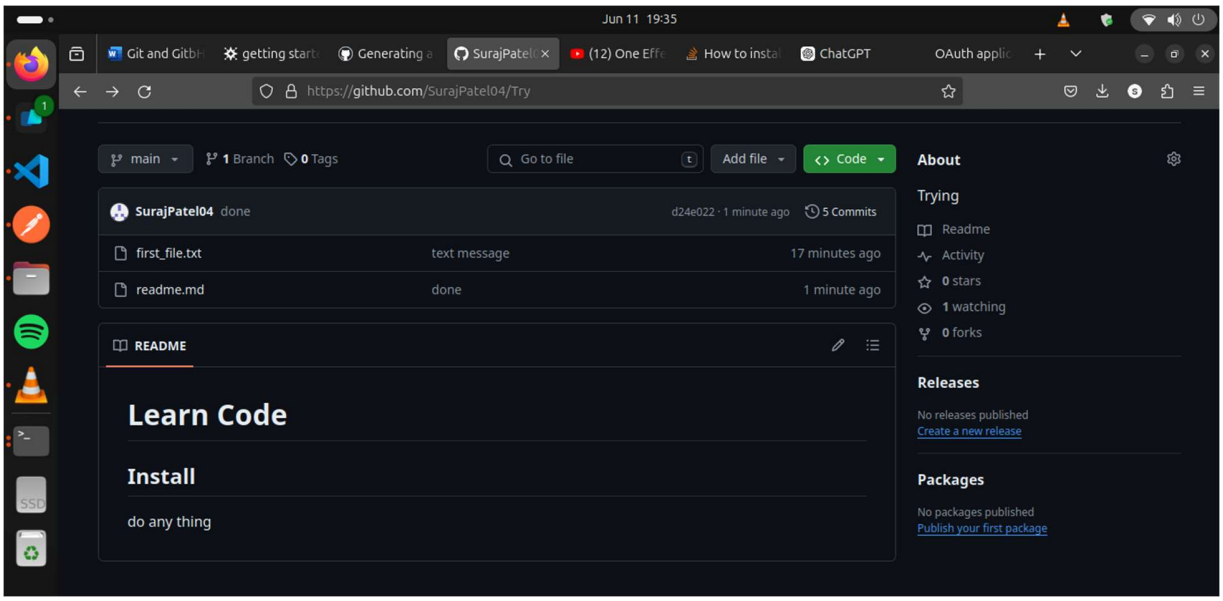
This will set up an upstream remote and push your code to the remote repository.

This will allow you to run future commands like `git pull` and `git push` without specifying the remote name.

6.4. Readme.md file



After push you get this

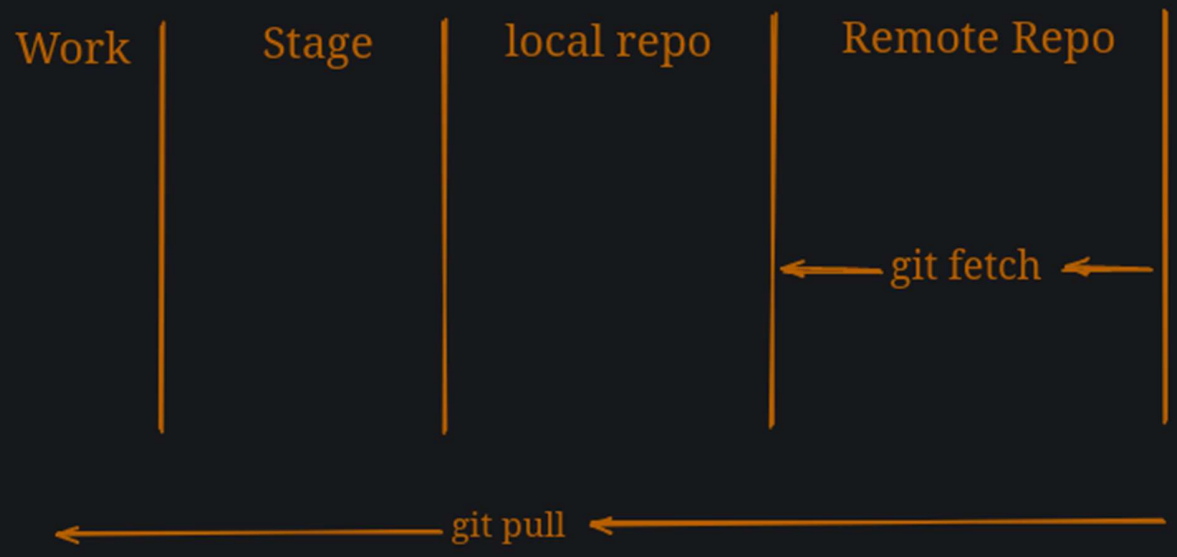


6.5. Get code from remote repository

There are two ways to get code from a remote repository:

- fetch the code
- pull the code

Fetch the code means that you are going to download the code from the remote repository to your local repository. Pull the code means that you are going to download the code from the remote repository and merge it with your local repository.



6.5.1. Fetch code

To fetch code from a remote repository, you can use the following command:

```
git fetch <remote-name>
```

Here `<remote-name>` is the name of the remote repository that you want to fetch from.

6.5.2. Pull code

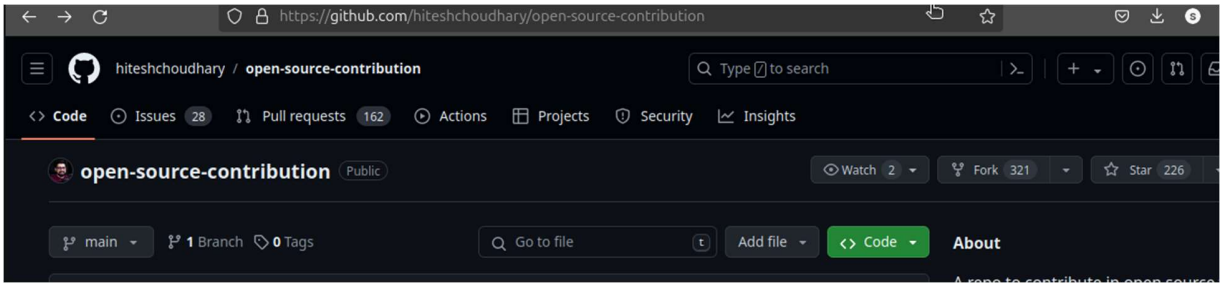
To pull code from a remote repository, you can use the following command:

```
# git pull <remote-name> <branch-name>
git pull origin main
```

Here `<remote-name>` is the name of the remote repository that you want to pull from and `<branch-name>` is the name of the branch that you want to pull.

7. Open Source

First step to create Fork



The clone by this step

Copy HTTPS

and go to vs code and type gti clone <url>

Then to you work and then add commit and push

If you want to send the changes then click on contribution button