Distributed Version Control System.
DVCS

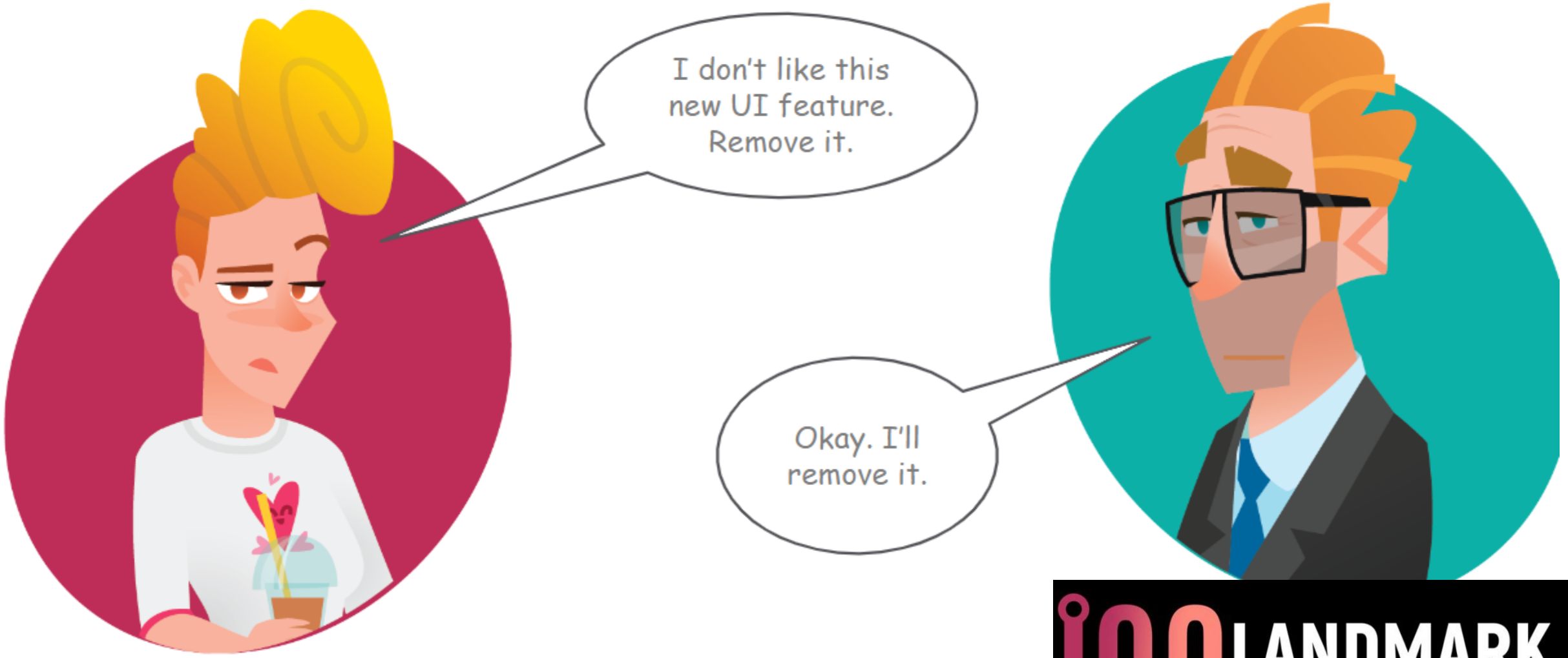
.

git

LANDMARK TECHNOLOGIES

Dave Working On A Project

Disapproval From Client



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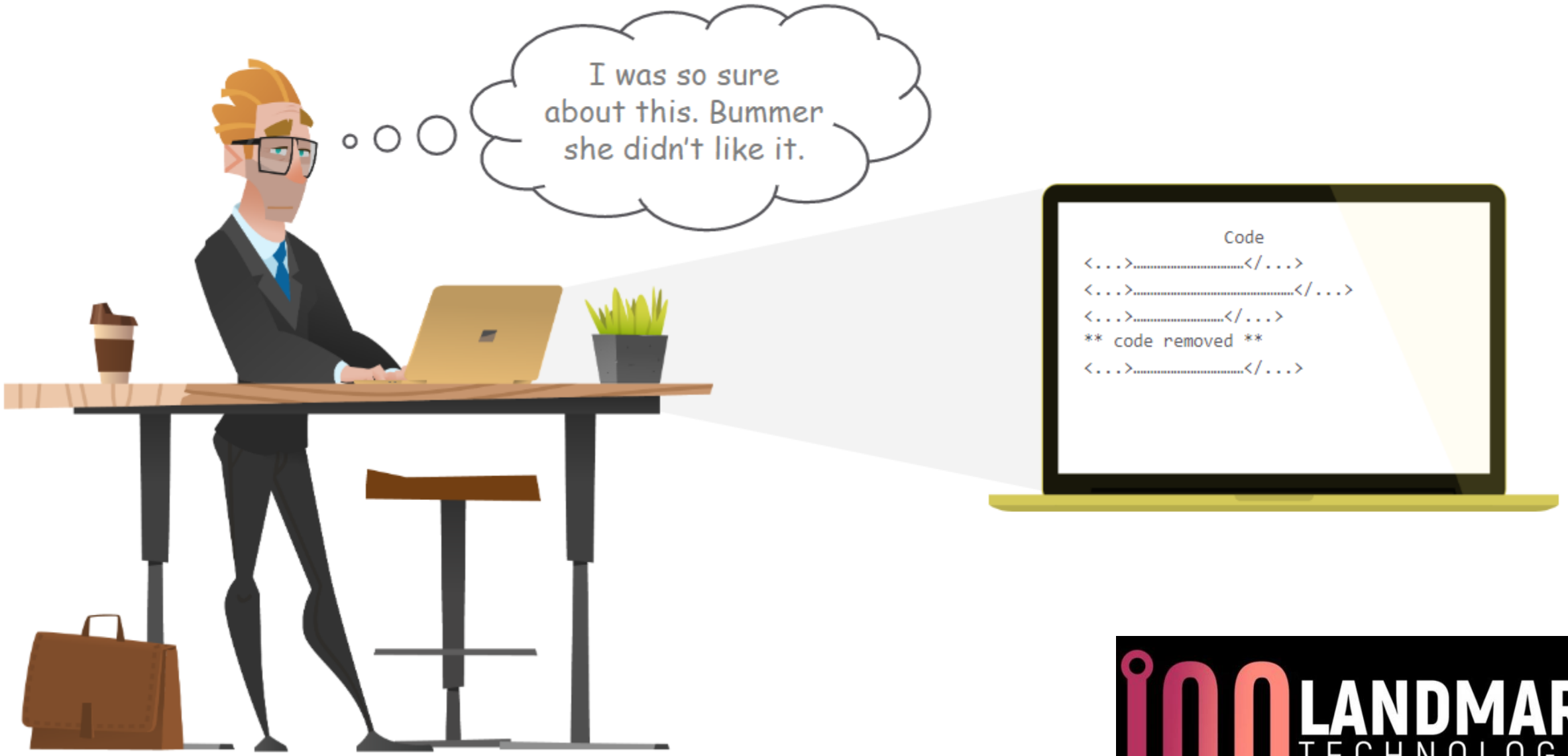
Dave Changes The Code



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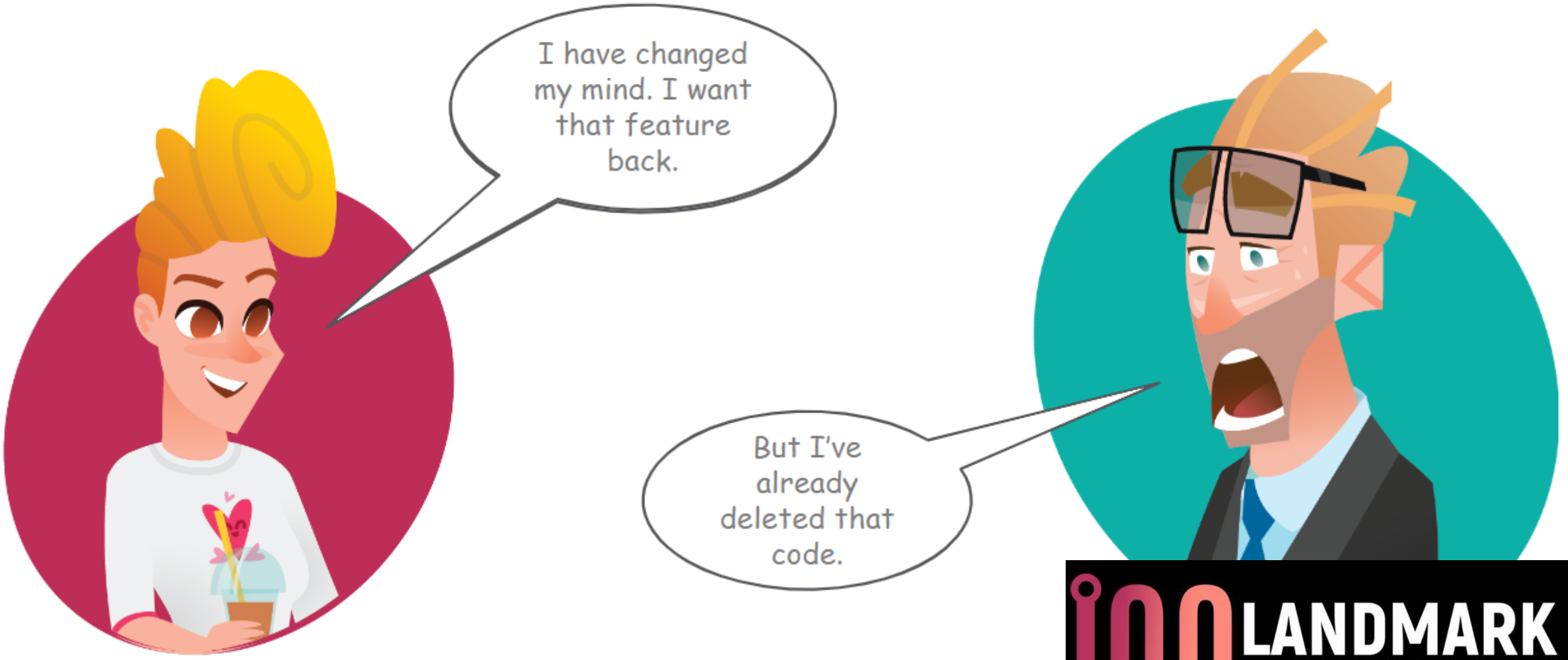
Client Changes Her Mind



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Dave Writes The New Code Again

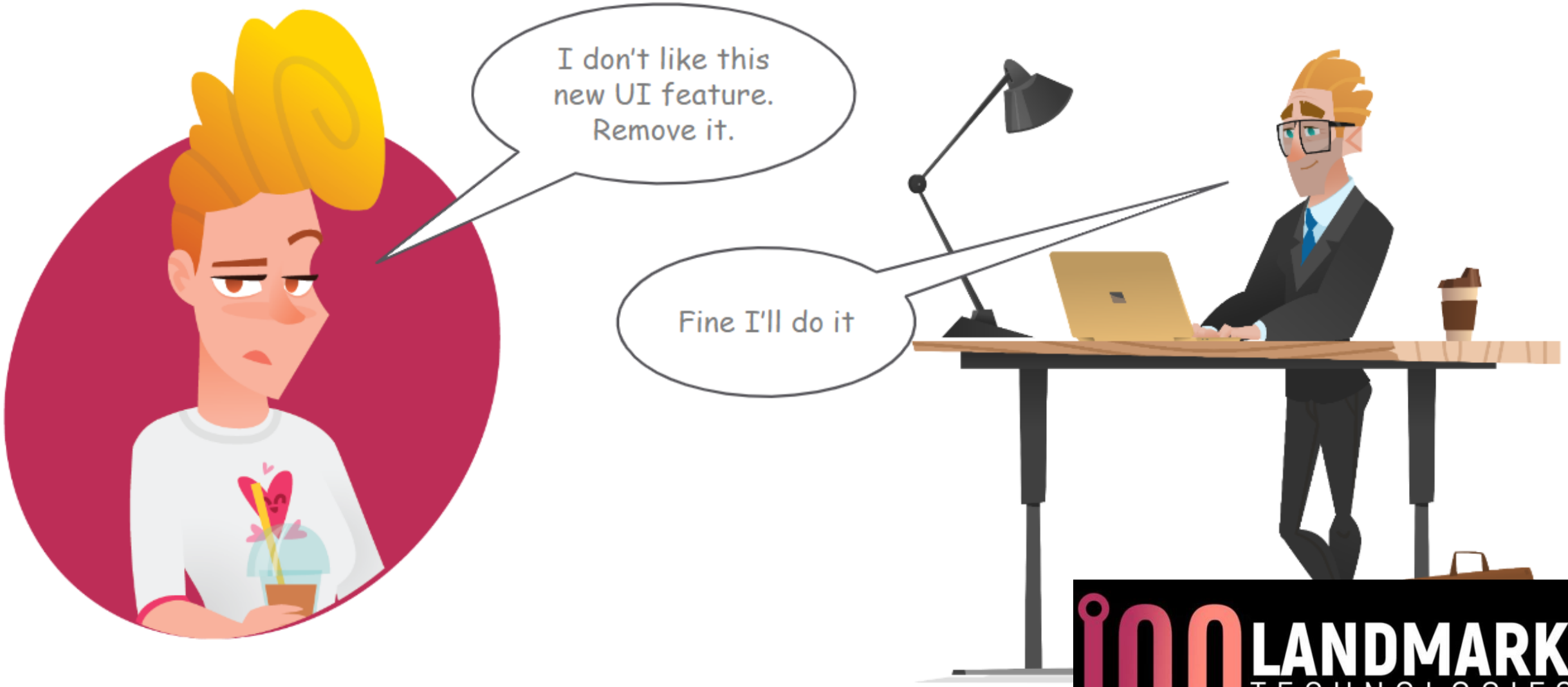
- 

Issues Without Version Control

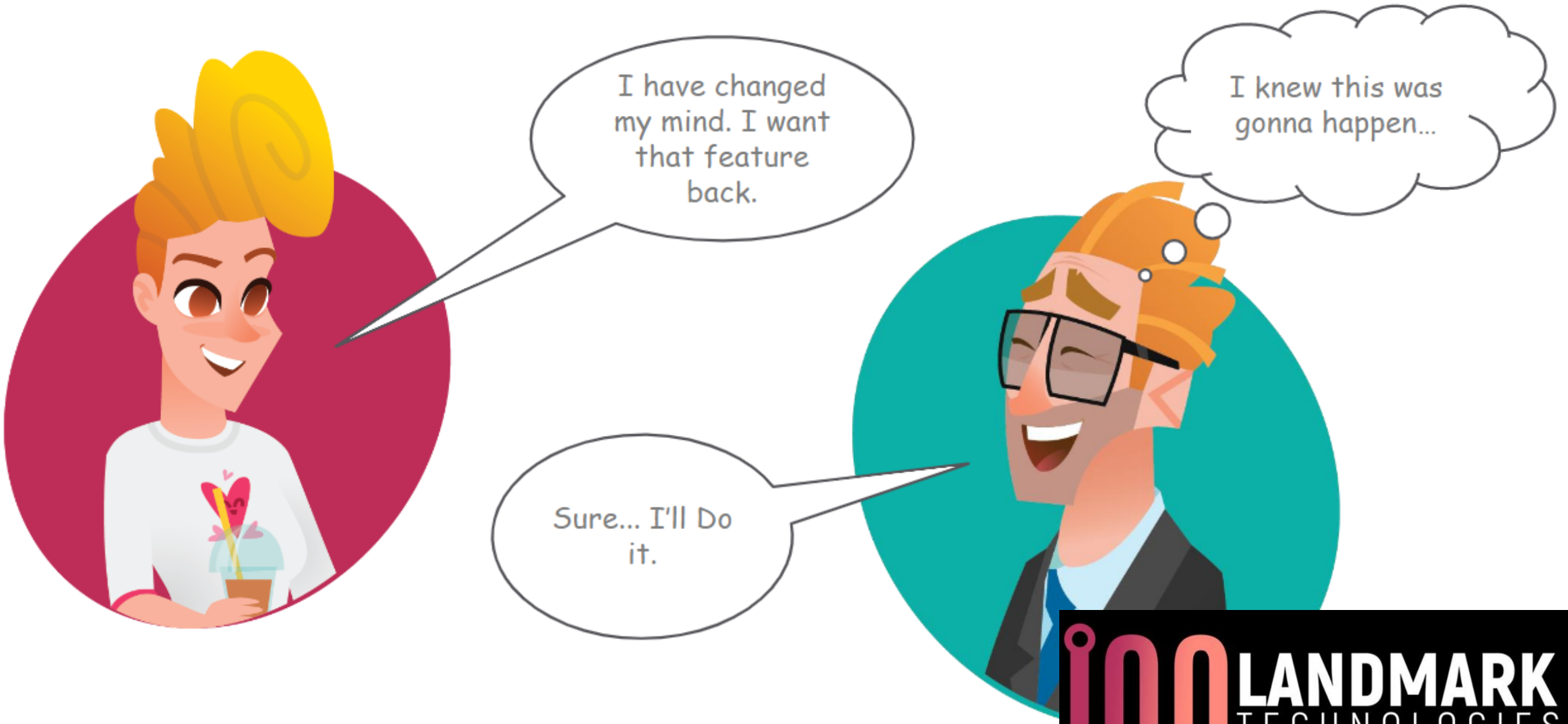
- Once saved, all the changes made in the files are permanent and cannot be reverted back
- No record oh what was done and by whom
- Downtime that can occur because of a faulty update could cost Millions in losses

- 
Same Scenario
With
VERSION
CONTROL

With Version Control: Disapproval From Client



With Version Control: Client Wants The New Feature



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Microsoft
GitHub

Version Control Saves The Day

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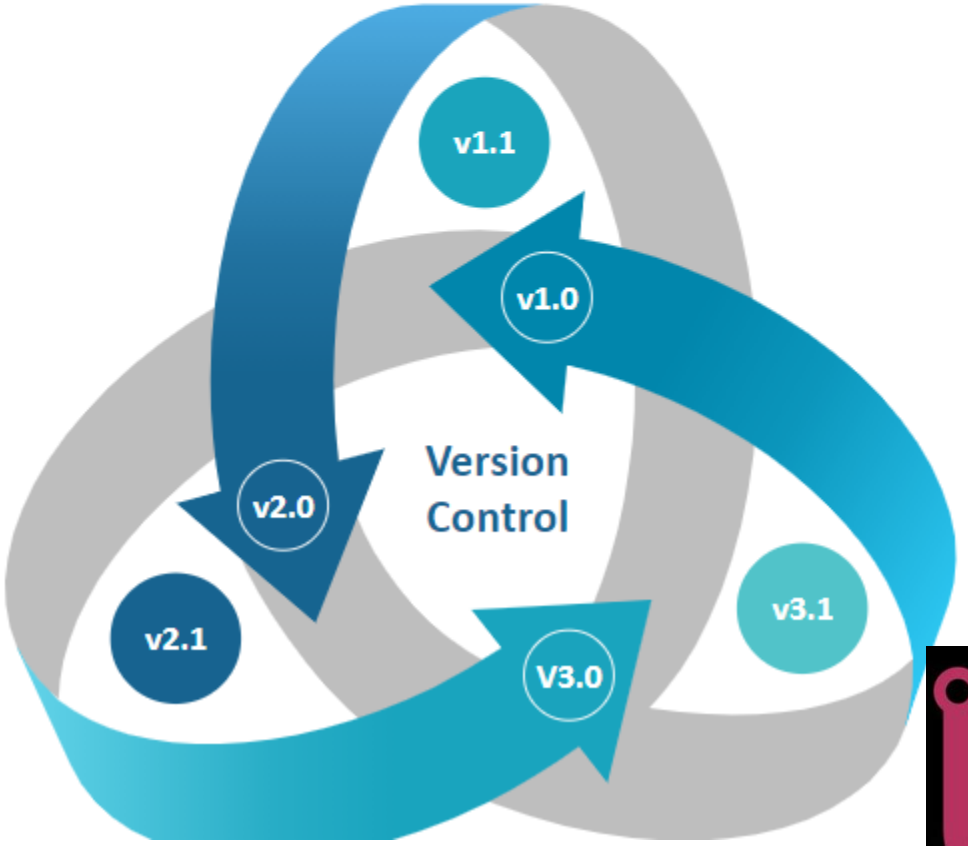
What Is Version Control?

Version Control is a system that documents changes made to a file or a set of files. It allows multiple users to manage multiple revisions of the same unit of information. It is a snapshot of your project over time.

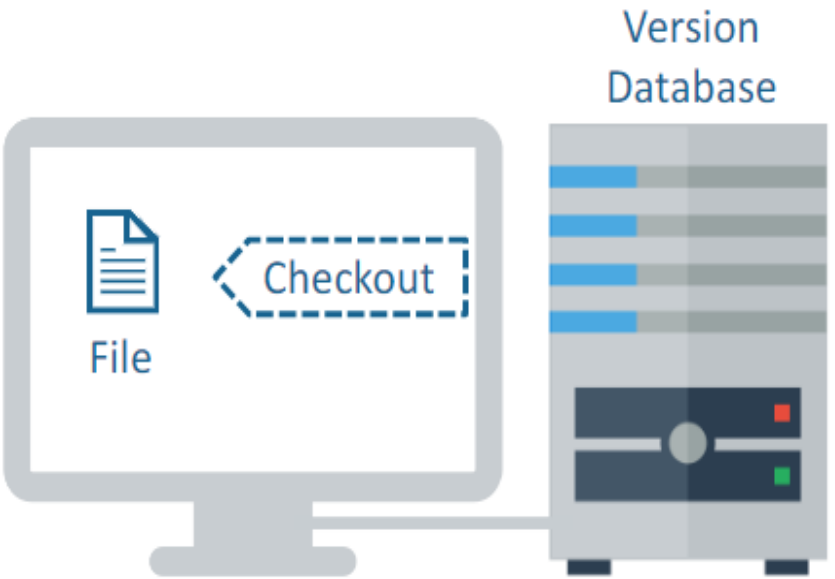


Version Control: Types

1. Local
2. Centralized
3. Distributed

Local Version Control (LVC)

- The practice of having the Version Database in the local computer
- Local database keeps a record of the changes made to files in version database

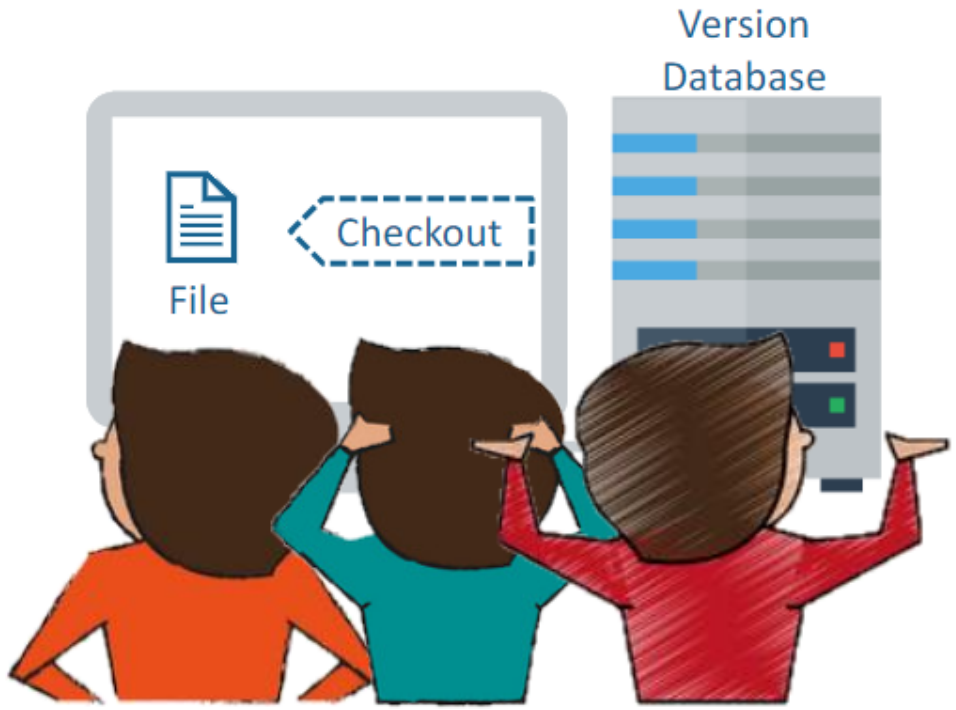


Version Control: Types

1. Local
2. Centralized
3. Distributed

Local Version Control: Issue

- **Issue:** Multiple people parallelly working on the same project
- **Solution:** Centralized Version Control



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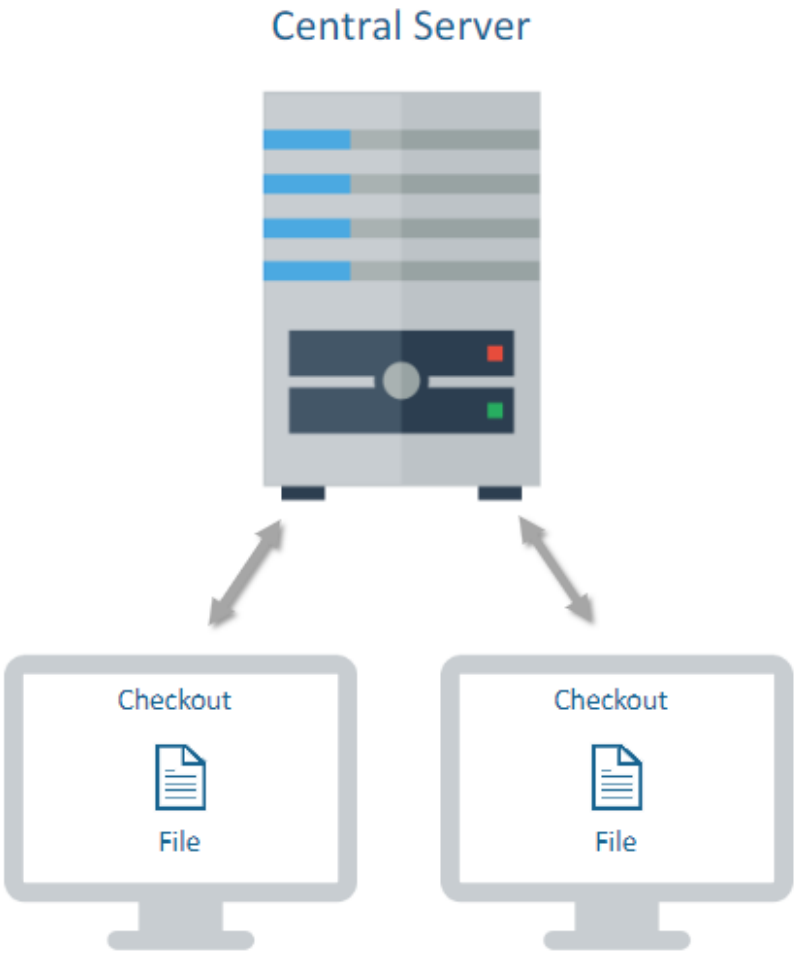
Version Control: Types

1. Local
2. Centralized
3. Distributed

Centralized Version Control (CVC)

- Local Version Control's issues are resolved by Centralized Version Control
- In CVC, a central repository is maintained where all the versioned files are kept
- Now users can checkout, and check-in files from their different computers at any time

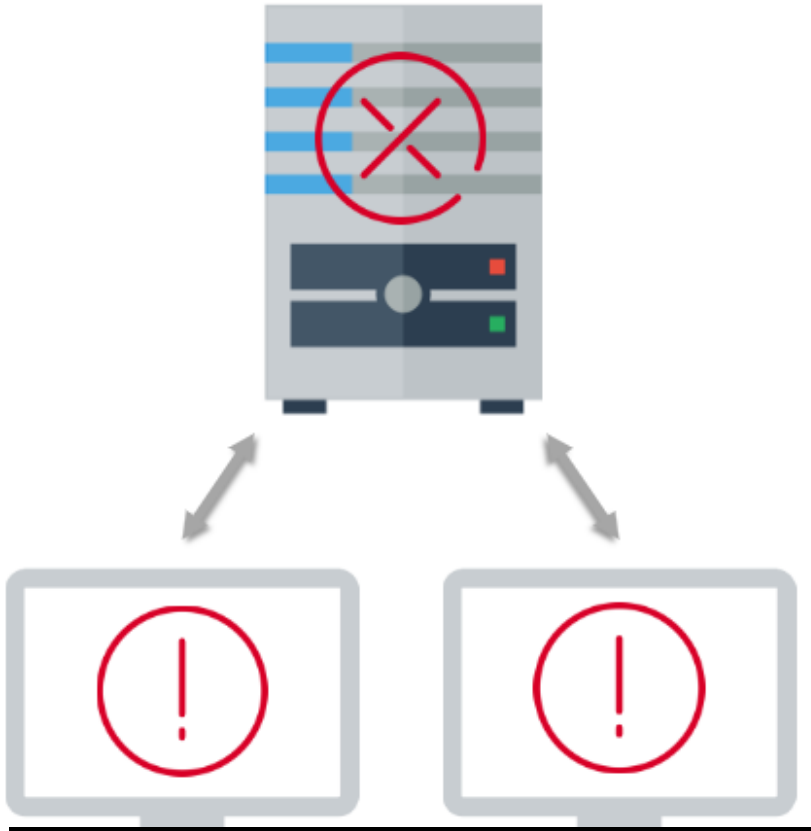


Version Control: Types

1. Local
2. Centralized
3. Distributed

Centralized Version Control: Issue

- **Issue:** In case of central server failure whole system goes down
- **Solution:** Distributed Version Control

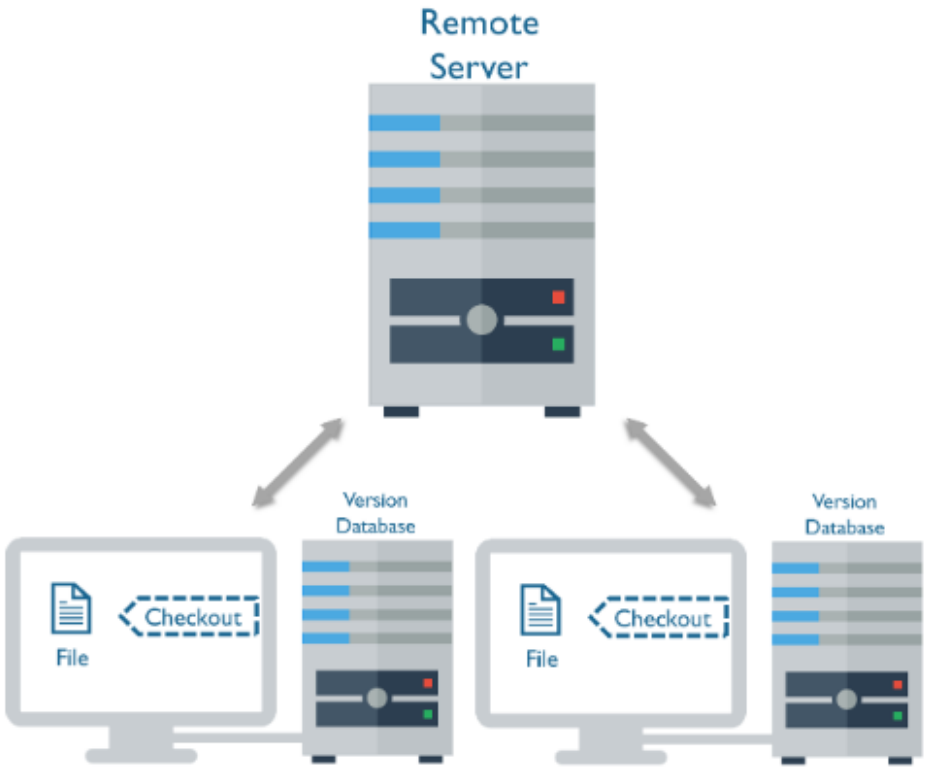


Version Control: Types

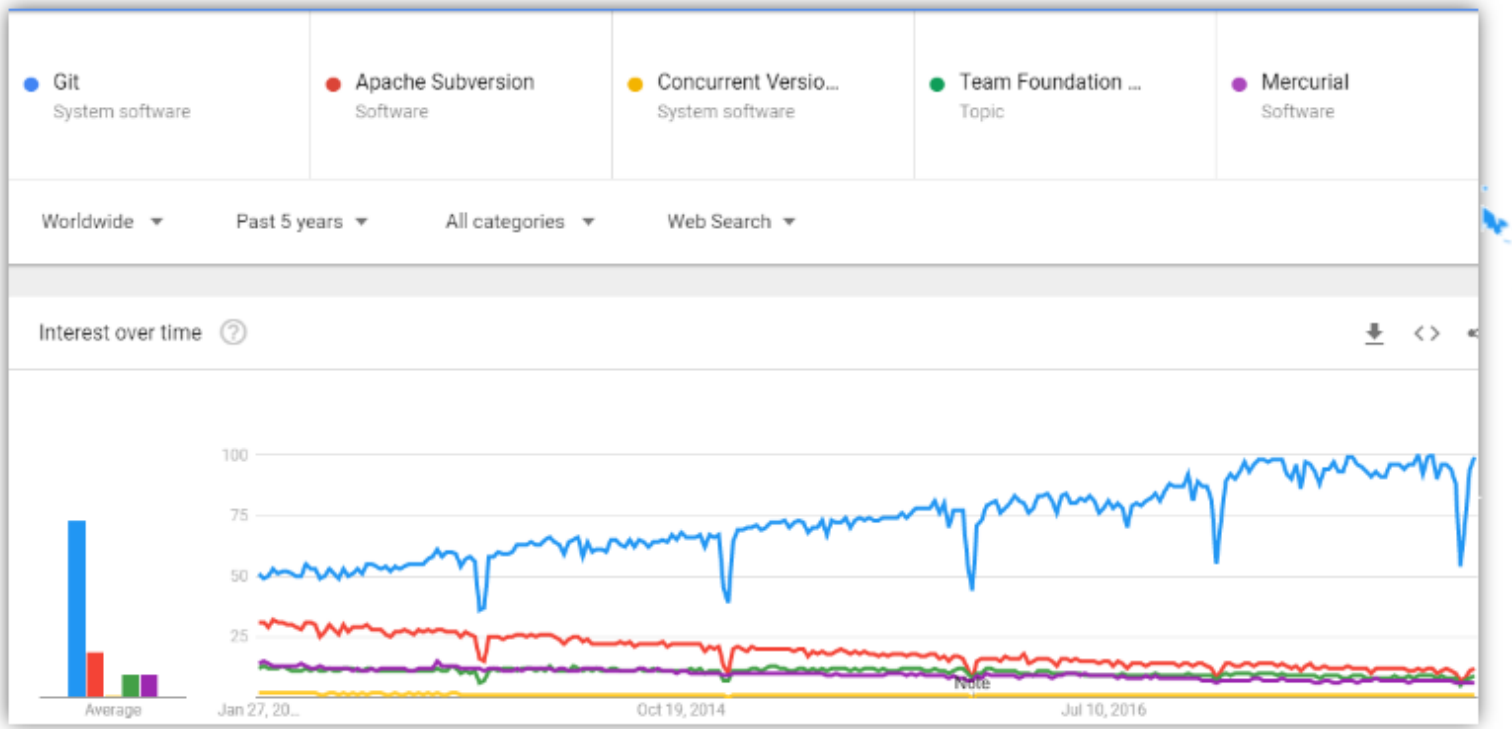
1. Local
2. Centralized
3. Distributed

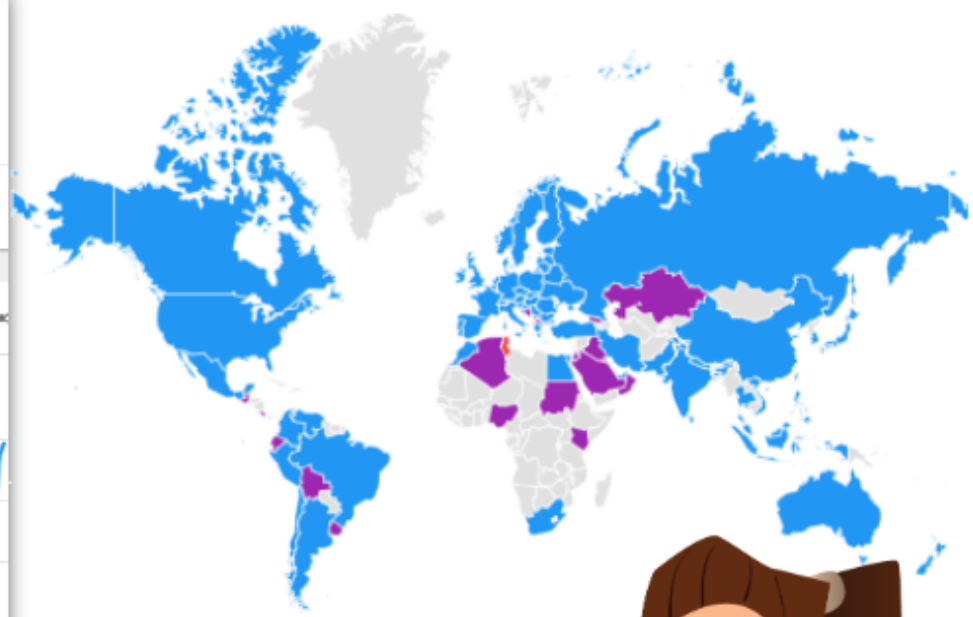
Distributed Version Control

- Version Database is stored at every users' local system and at remote server
- Users manipulate the local files and then upload the changes to the remote server
- If any of the server dies, a client server can be used to restore



Why Git?





Note: The above graph shows the usability of the popular VCS tools in the past 5 years

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Why Git is a Clear Winner?

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Snapshots

Git records changes made to a file rather than file itself. That means if a file isn't changed it isn't stored again.

Fast Operations

Almost every operation on git is local, hence the speed offered by Git is lightening fast compared to other VCS's.

Distributed

Every user has his own copy of the repository data stored locally allowing full functionality even on disconnection.

Branch Handling

Every collaborator's working directory is in itself a branch. Different branches can be merged with ease.

Integrity

Check-sum before storing ensures that you can't make any changes to anything without Git recording that change.

Robust

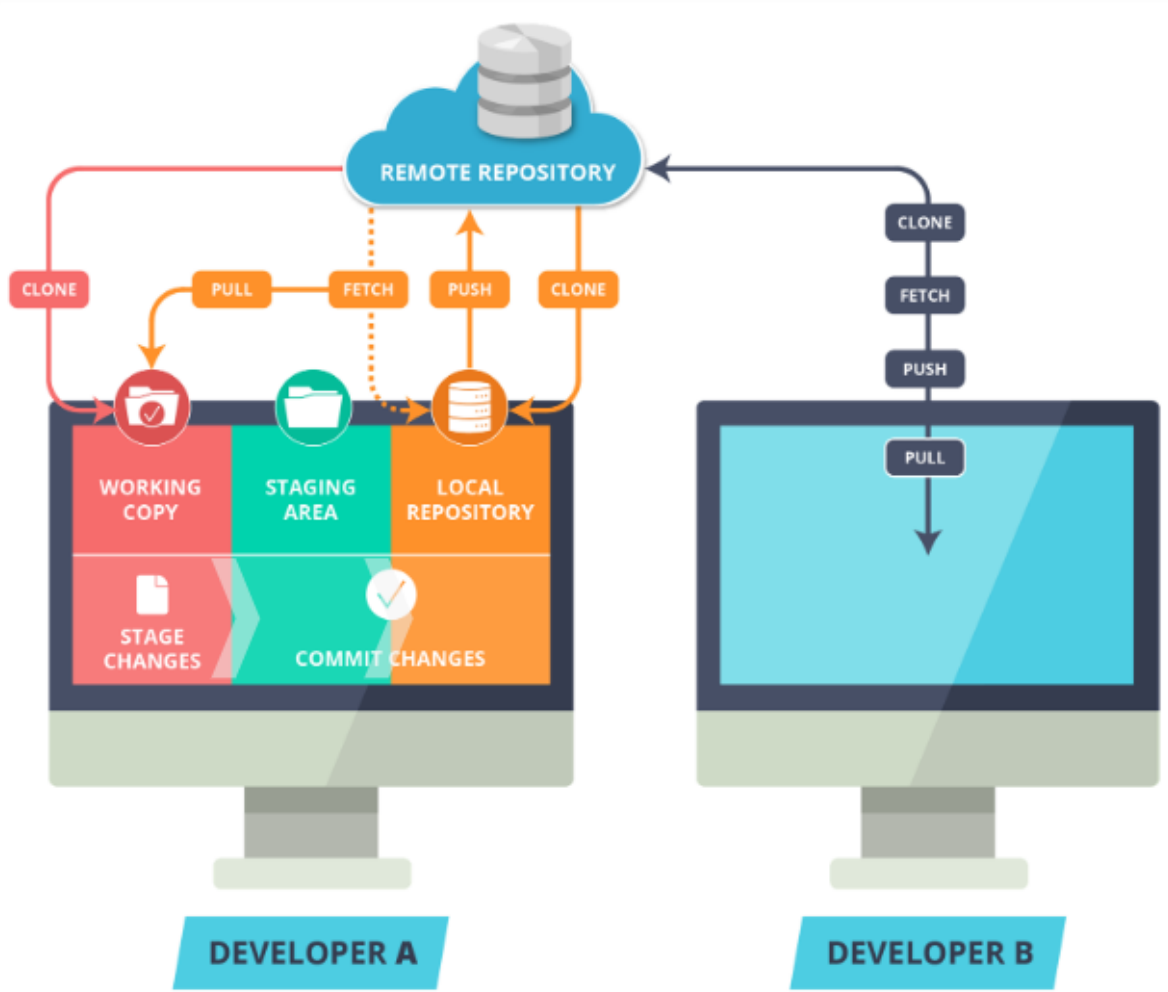
Nearly every task in Git is undo-able and it is really hard to loose any change or data in Git.

What is Git?

Git is an open source Distributed Version Control System(DVCS) which records changes made to the files laying emphasis on **speed**, **data integrity** and **distributed**, **non-linear workflows**

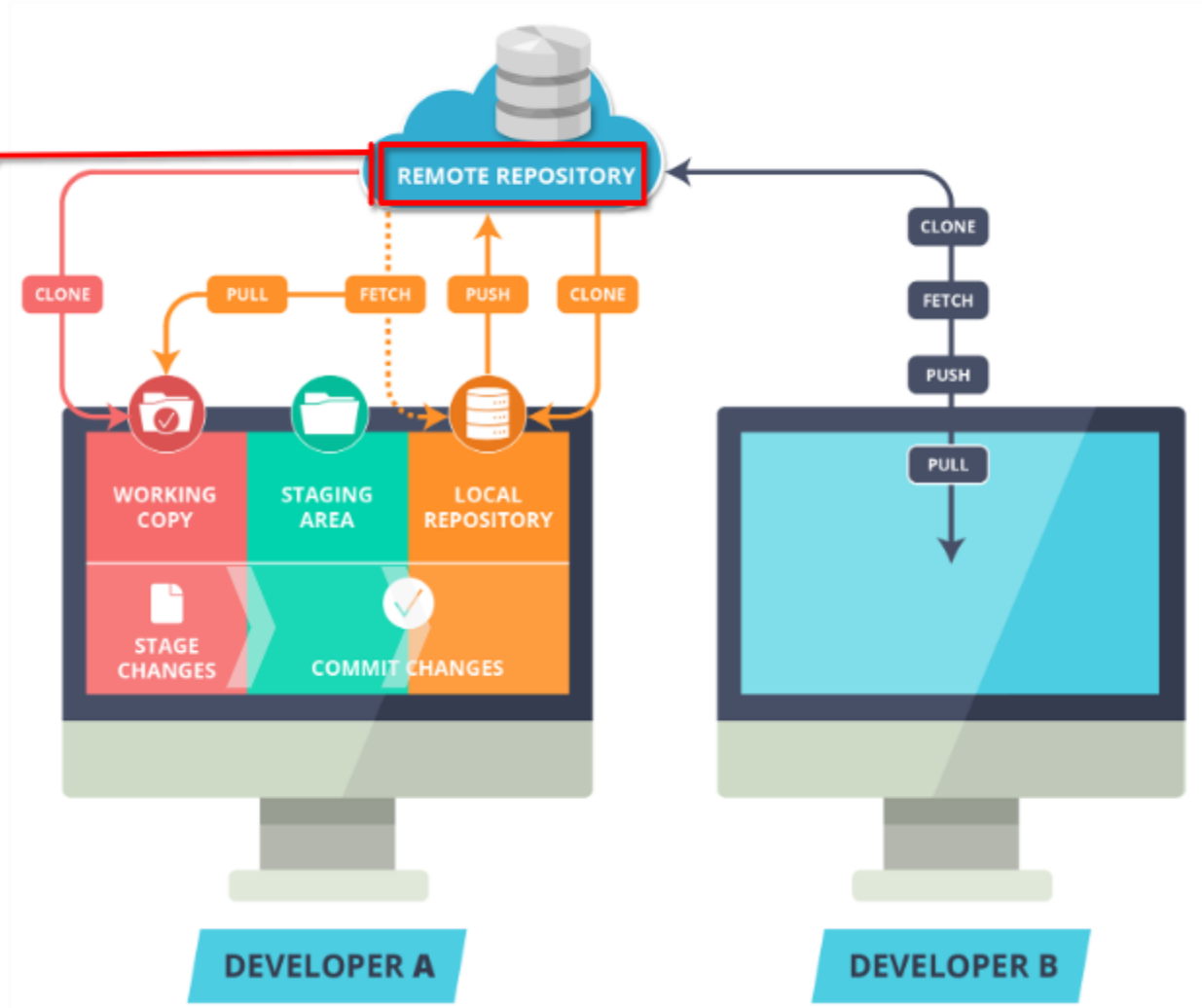
The Git File Workflow

- Use Git workflow to manage your project effectively
- Working with set of guidelines increases Git's consistency and productivity



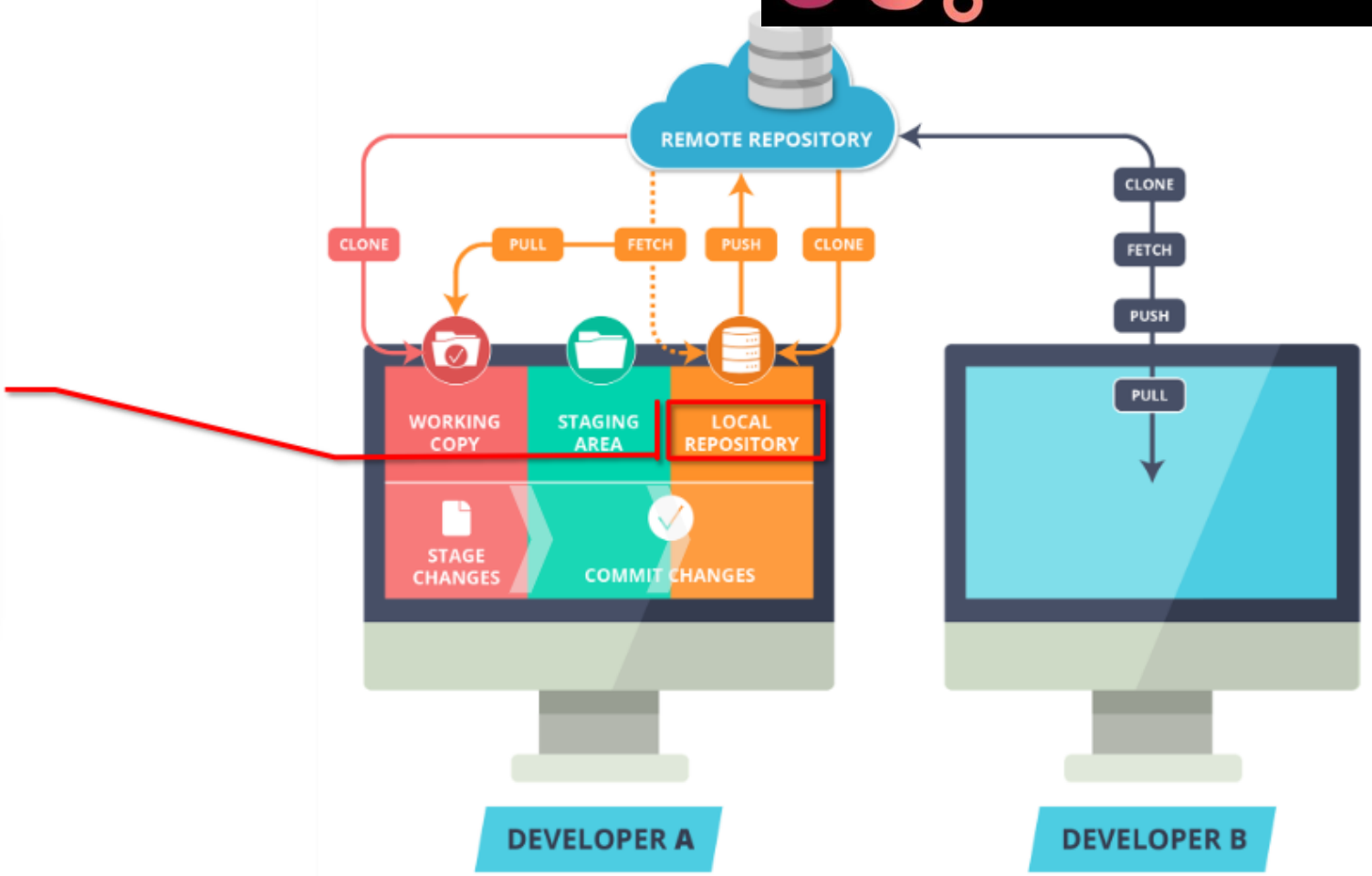
The Git File Workflow

The Remote Repository is the server where all the collaborators upload changes made to the files



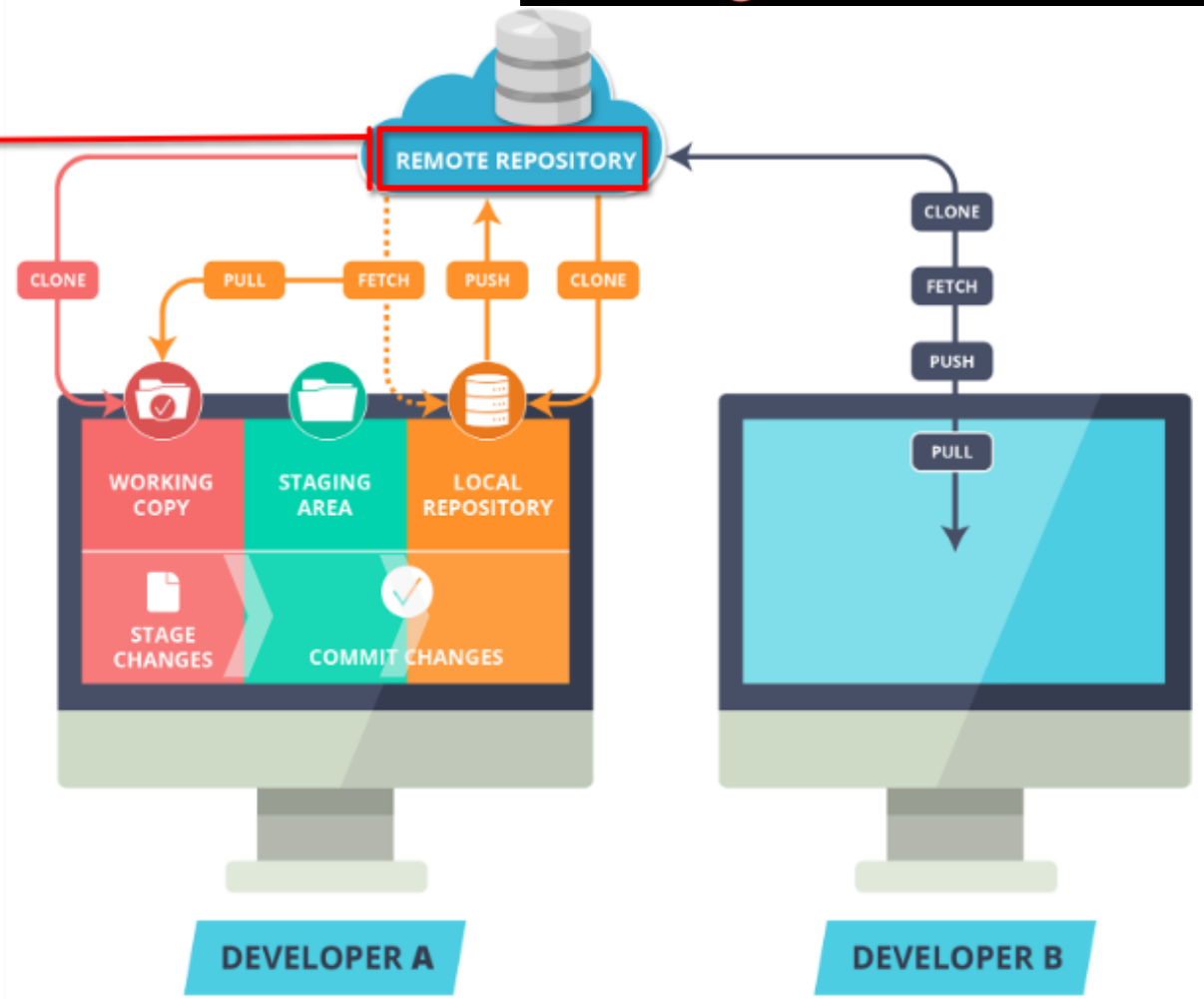
The Git File Workflow

- "**Local Repository**" is user's copy of the Version Database
- The user accesses all the files through local repository and then push the change made to the "**Remote Repository**"



The Git File Workflow

The Remote Repository is the server where all the collaborators upload changes made to the files



The Git File Workflow

- "**Local Repository**" is user's copy of the Version Database
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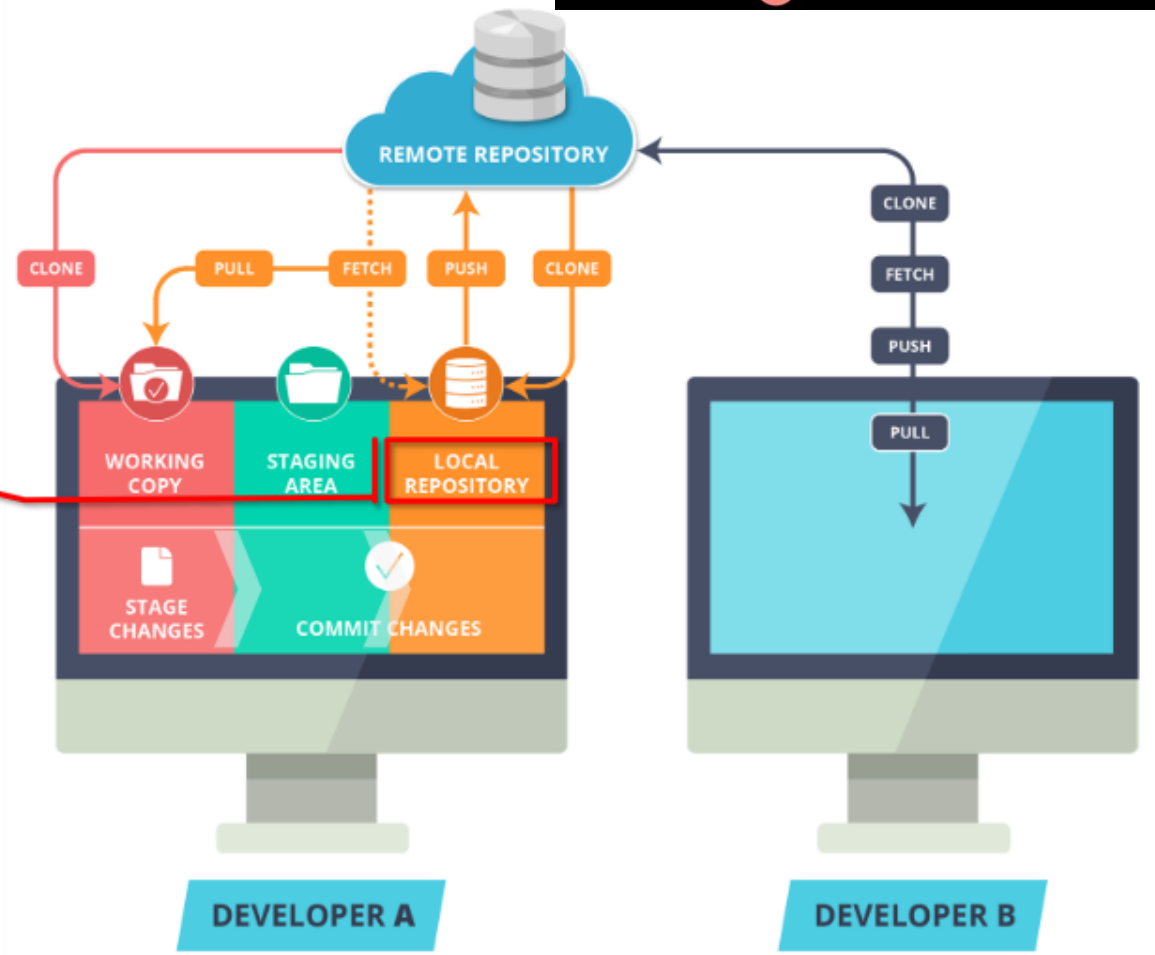
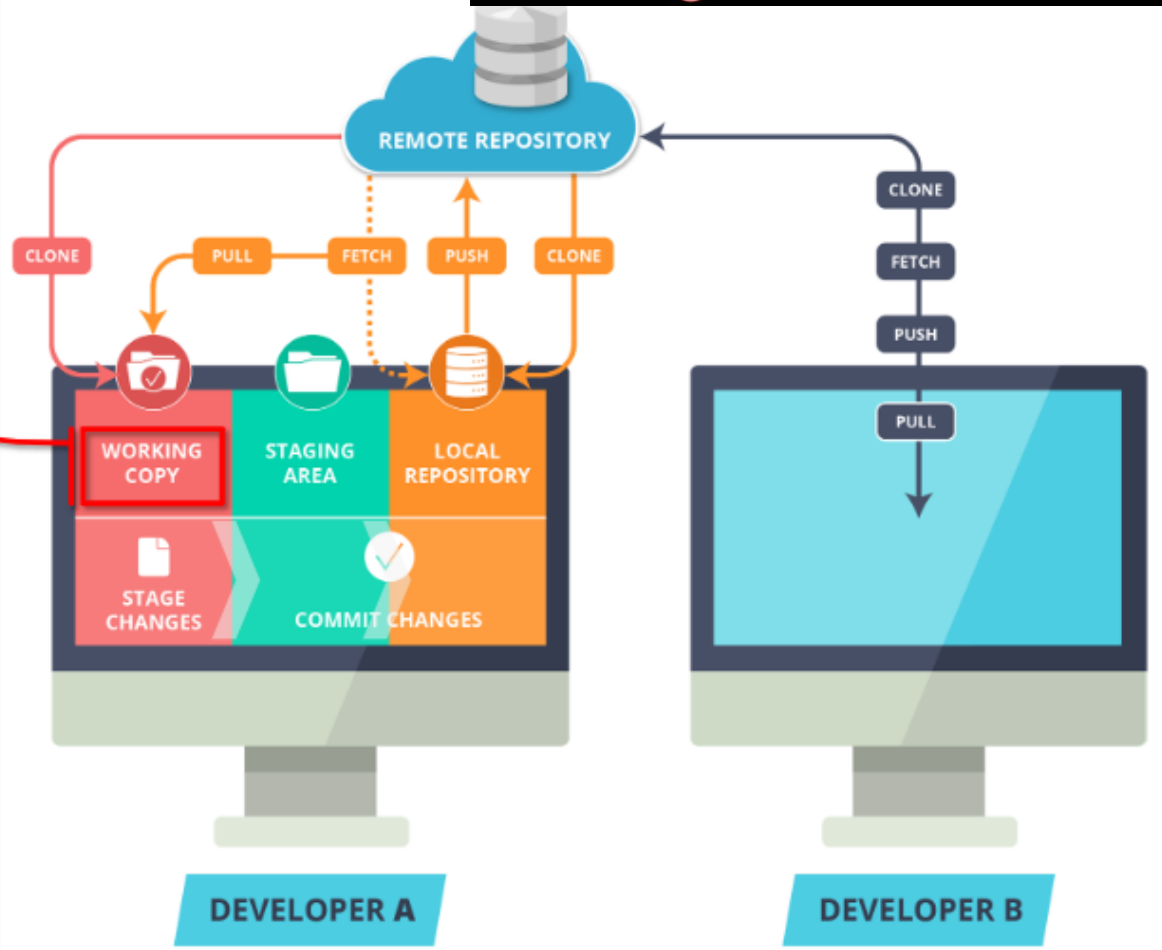


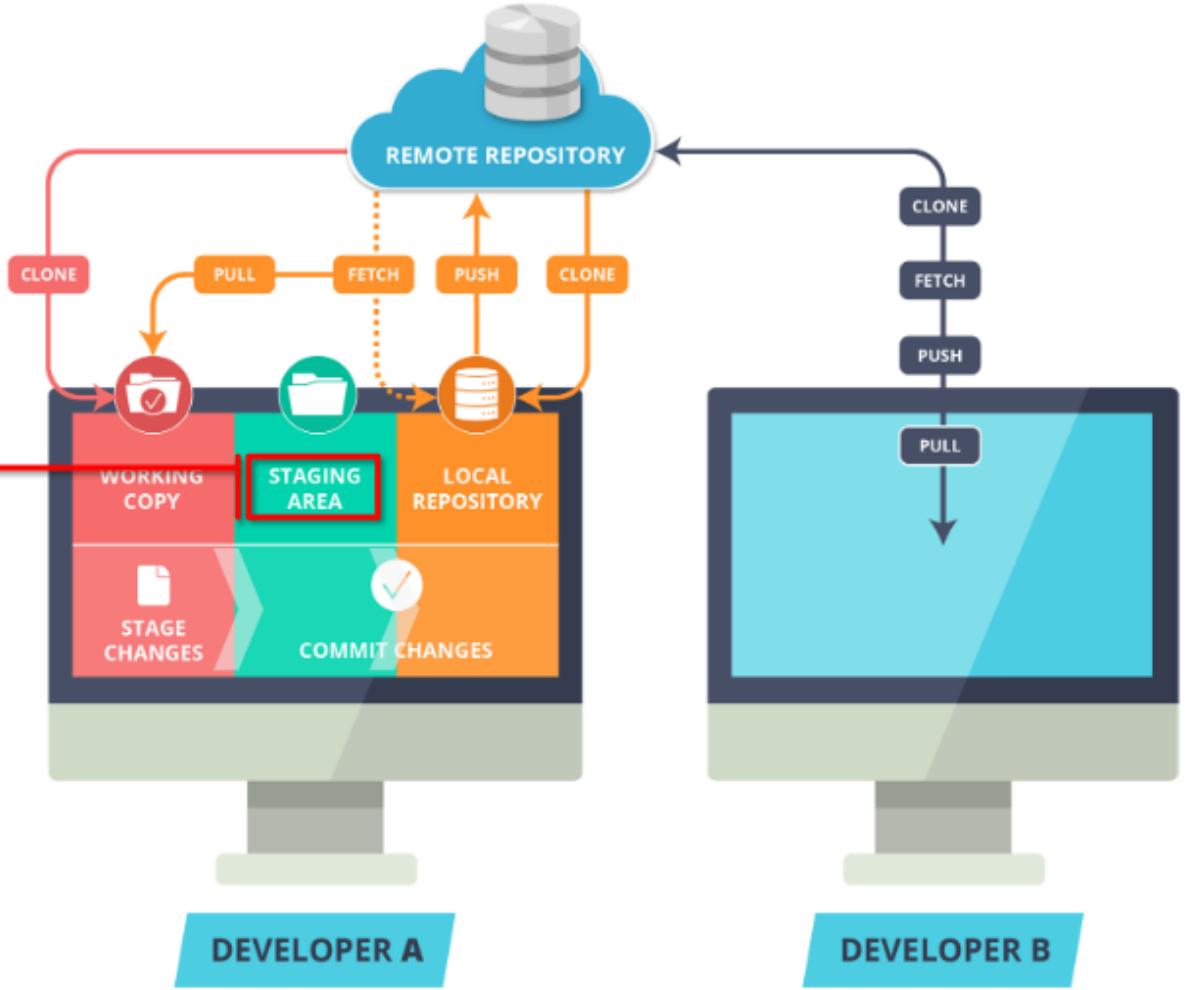
The Git File Workflow

- **"Workspace"** is user's active directory
- The user modifies existing files and creates new files in this space. Git tracks these changes compared to your Local Repository



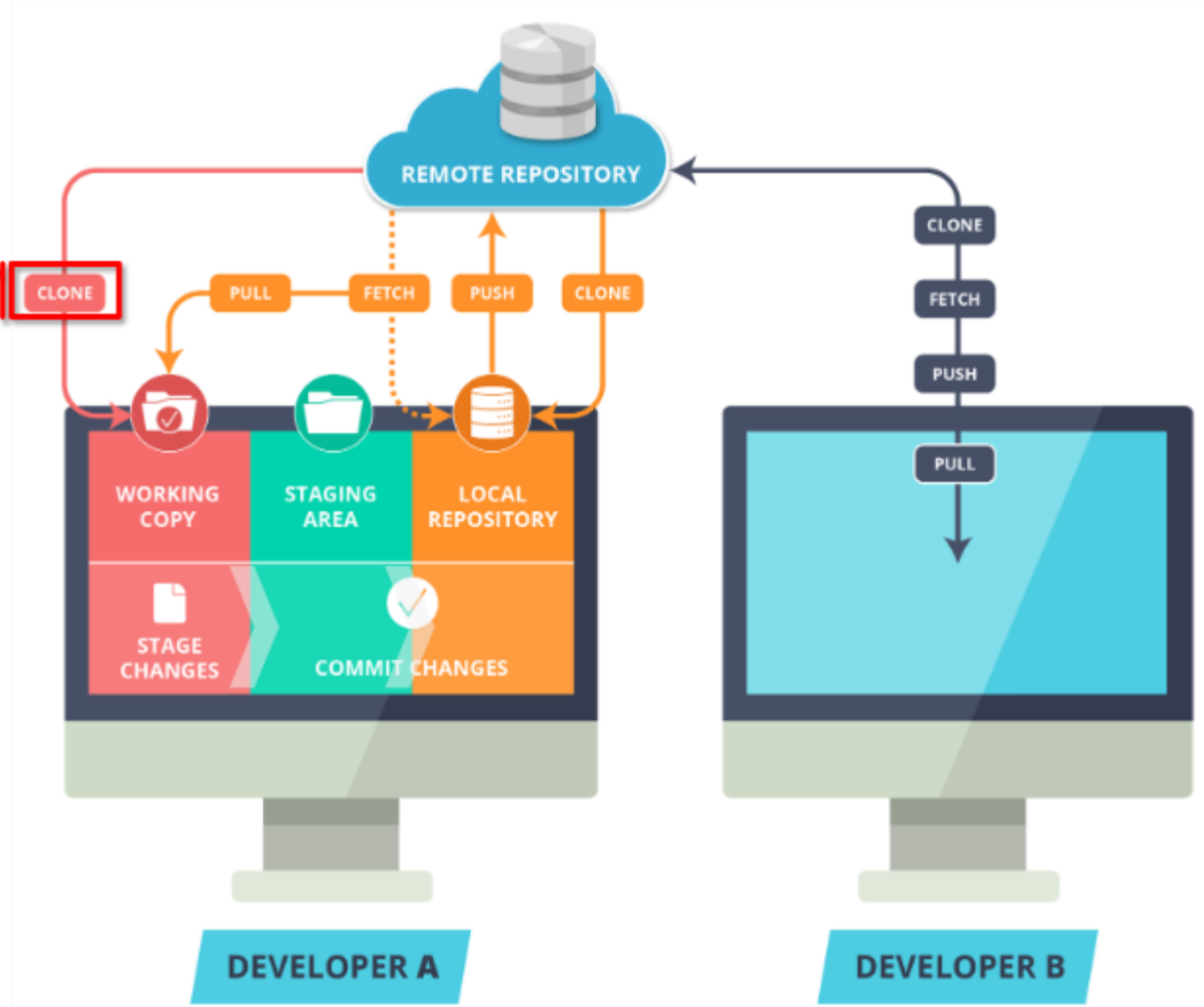
The Git File Workflow

Stage is a place where all the modified files marked to be committed are placed.



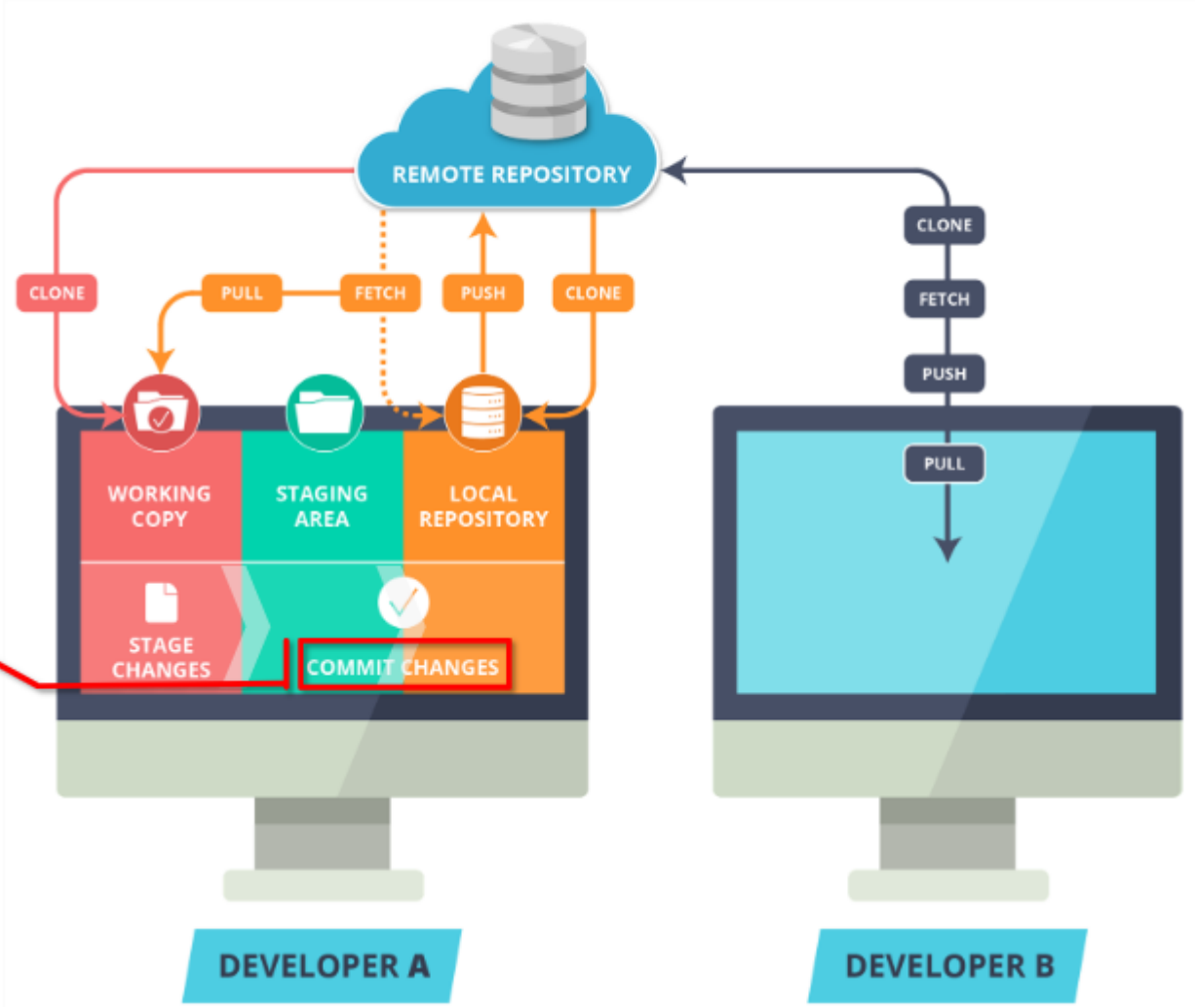
The Git File Workflow

Clone command creates a copy of an existing Remote Repository inside the Local Repository.



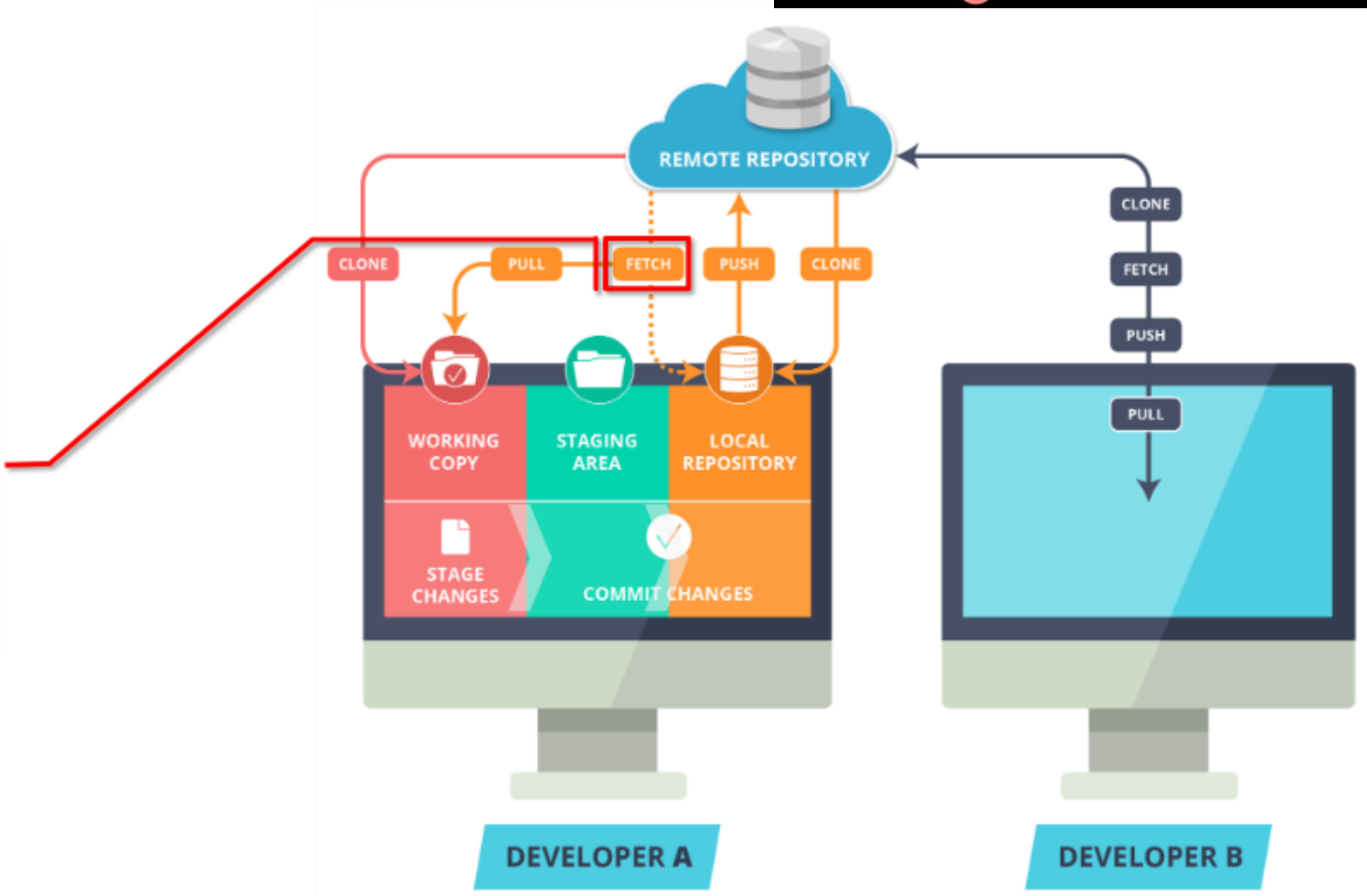
The Git File Workflow

Commit command commits all the files in the staging area to the local repository.



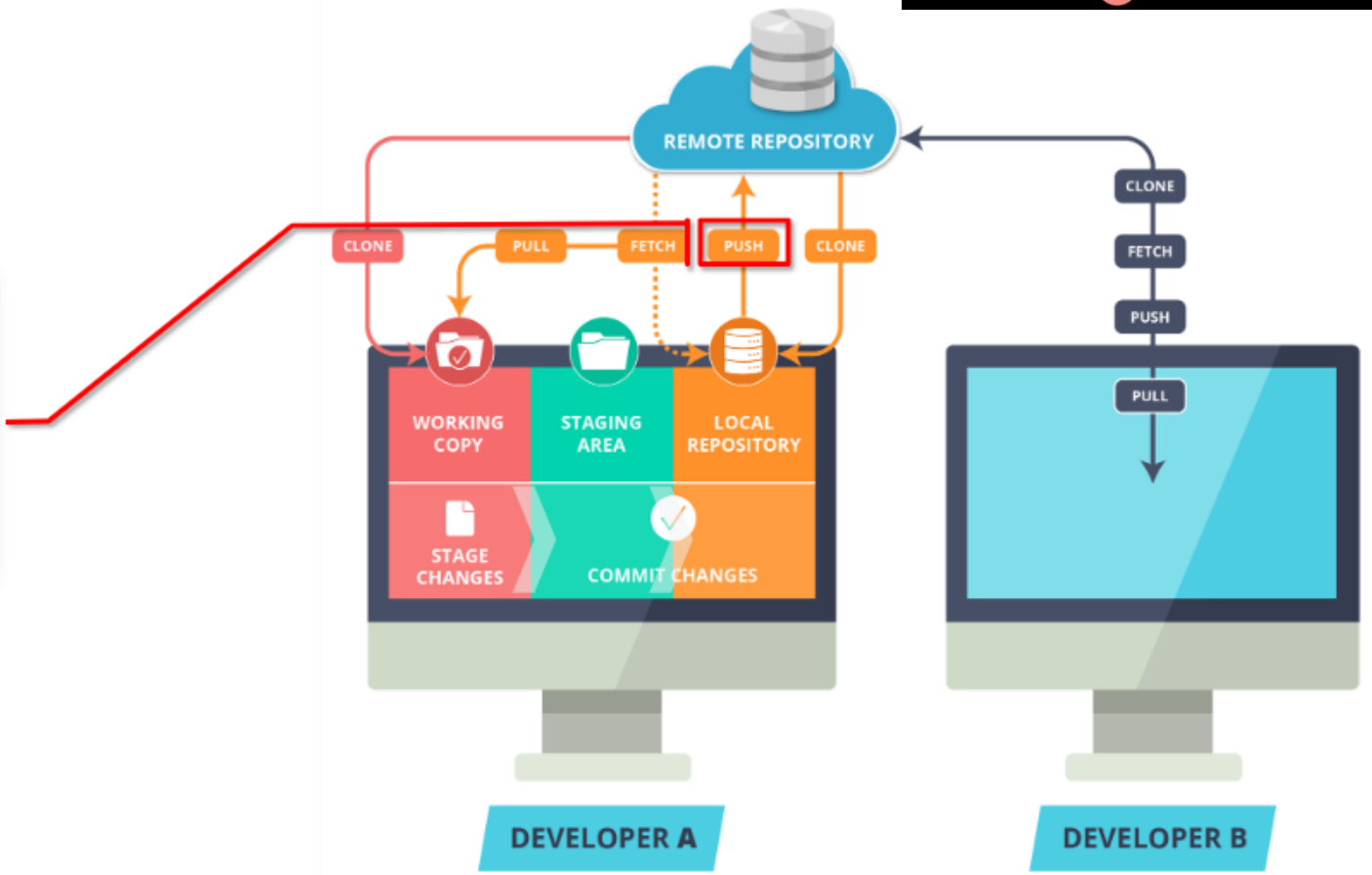
The Git File Workflow

Fetch command collects the changes made in the Remote repository and copies them to the Local Repository. This command doesn't affect our Workspace.



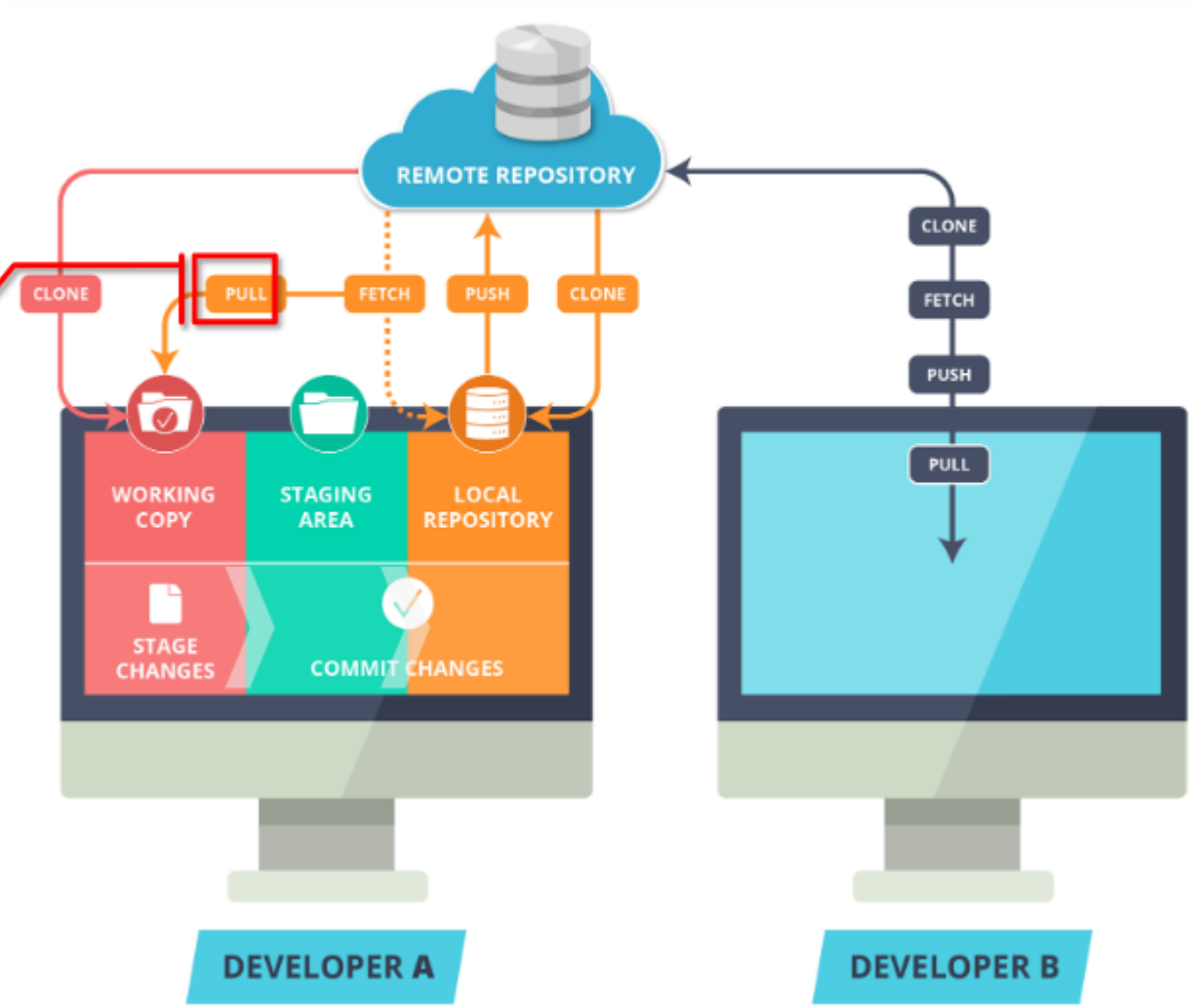
The Git File Workflow

Push command pushes all the changes made in the Local Repository to the Remote Repository

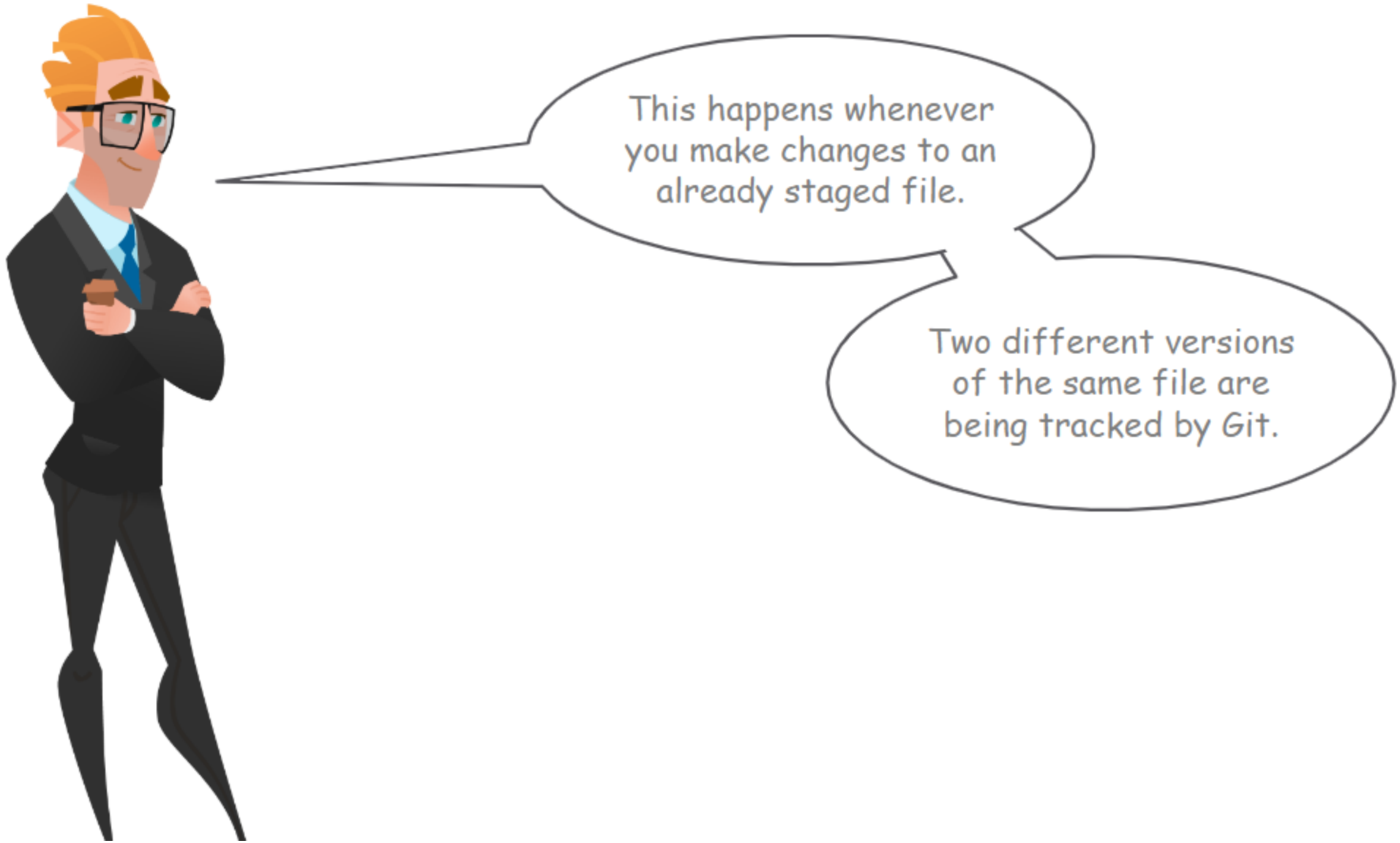


The Git File Workflow

- Pull like Fetch, gets all the changes from the remote repository and copies them to the Local Repository
- Pull merges those changes to the current working directory



Why a File is both `staged` and `unstaged`?



Removing Files From Repository

- The **git rm** command deletes the file from git repository as well as users system

```
Syntax: git rm <filename>
```

```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git rm Demo.class
```

- To remove the file from git repository but not from the system **--cached** option

```
Syntax: git rm --cached <filename>
```

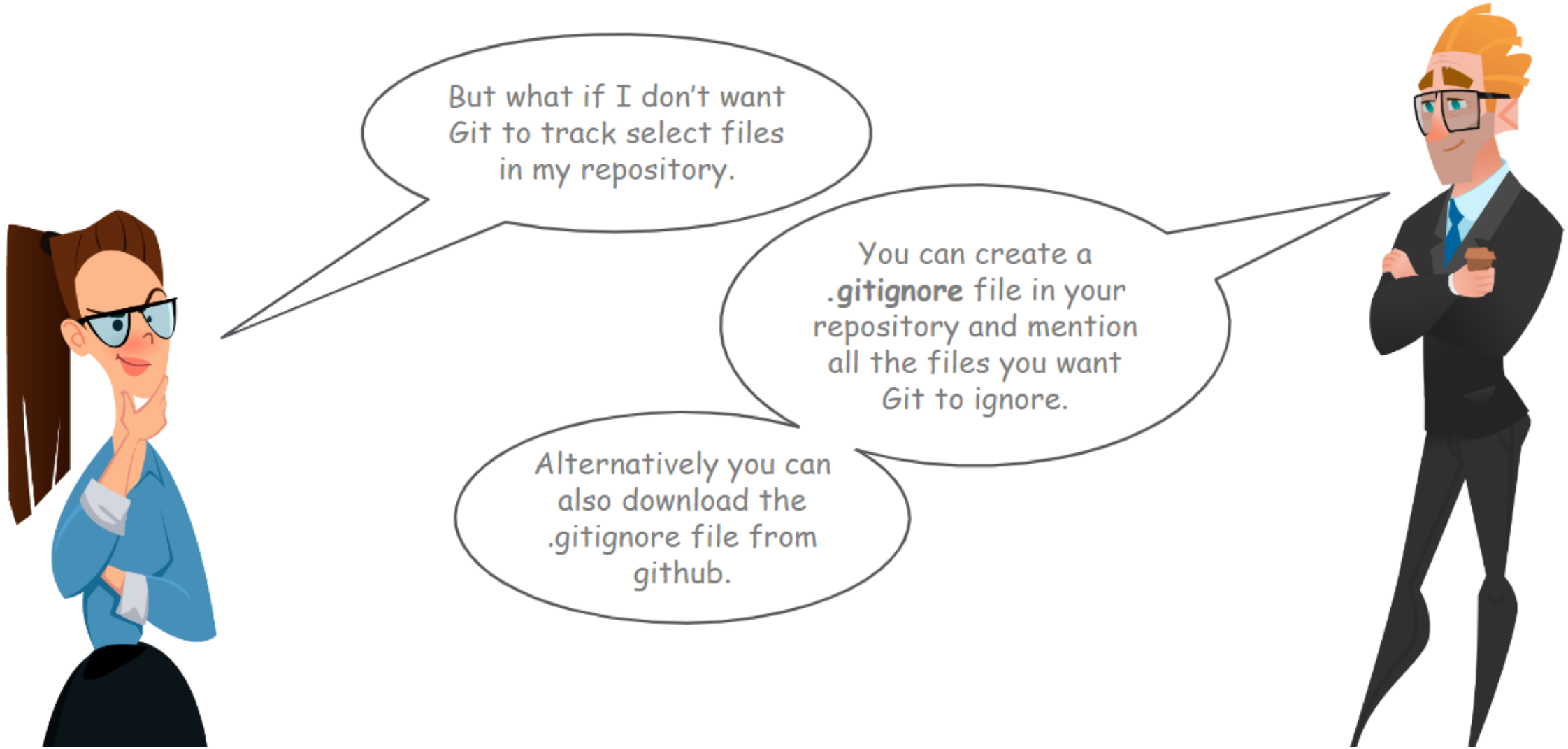
```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git rm --cached Demo.class
rm 'Demo.class'
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```

- An error shows up if you try to delete a staged file

- You can force remove a staged file by using **–f** flag

```
Syntax: git rm -f <filename>
```

Ignoring Files



Commit Tags


But what if I want to access a particular commit.
I'll have to remember the entire hexcode(commitID) of that commit


Why don't you use **commit tags** as aliases and keep the track of different commits

Commit: Git Tag

- Commit tags provide an alias for commitID

```
Syntax: git tag --a <annotation> --m <message>
```

- You can also view all the tags you have created

```
Syntax: git tag
```

```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git tag -a v1.3 -m 'Version 1.3'
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git tag
v1.3
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```

Commit Tags

- Adding a tag to one of the previous commits

```
Syntax: git tag --a <annotation> <commit id> --m <message>
```

- Commit id can be obtained from git logs

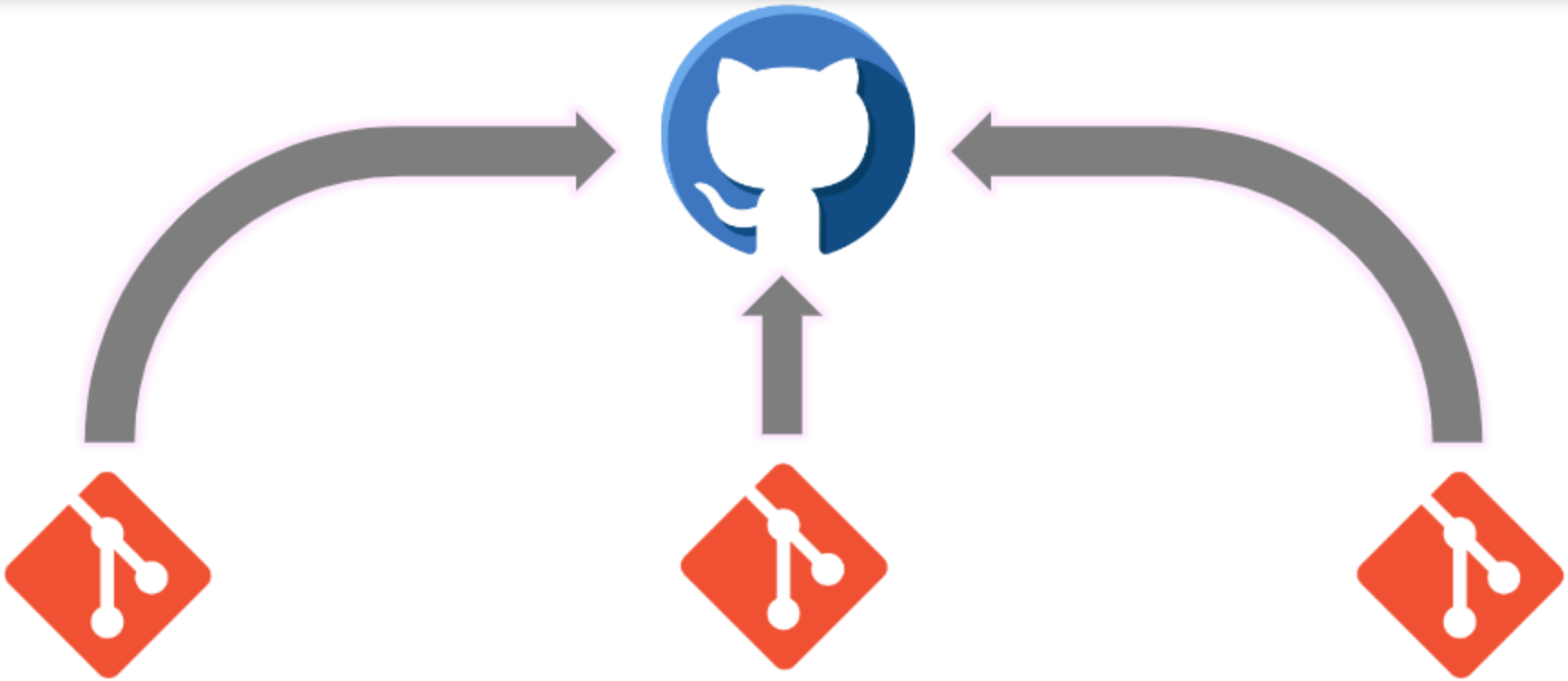
- All these tags can be viewed in git

```
Syntax: git show <tag-name>
```

```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git tag -a v0.3 11cf392d -m 'Added tag to a previous commit'
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git show v0.3
tag v0.3
Tagger: amrjeet <amrinderjeet.singh@edureka.co>
Date:   Wed Jan 31 11:51:32 2018 +0530

Added tag to a previous commit

commit 11cf392dc4307d8446fdc4419e8d9c3674549385
Author: amrjeet <amrinderjeet.singh@edureka.co>
Date:   Tue Jan 30 15:30:56 2018 +0530

    removed .class extension files

diff --git a/Demo.class b/Demo.class
deleted file mode 100644
index fa53ecb..0000000
Binary files a/Demo.class and /dev/null differ
diff --git a/Demo2.class b/Demo2.class
deleted file mode 100644
index 81c13a3..0000000
Binary files a/Demo2.class and /dev/null differ
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```

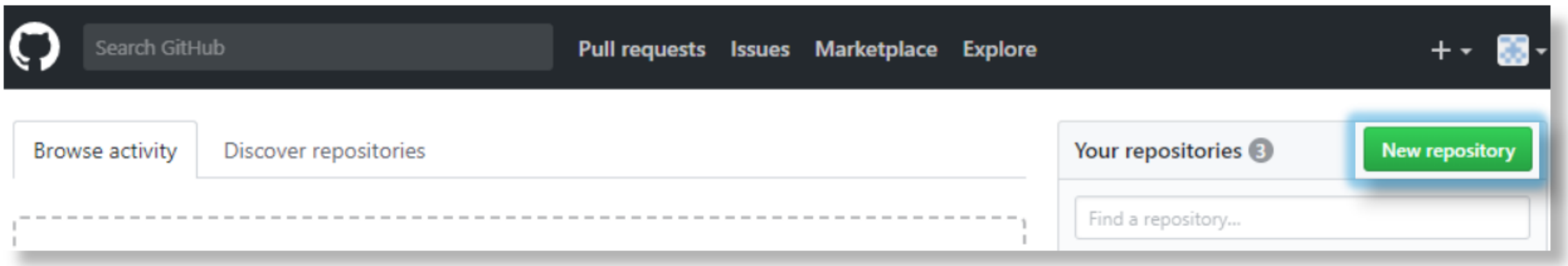
What Is A Remote Repository?

Mostly the users work on a local repository. But in order to collaborate with other people, we use a remote repository. A remote repository is place where the users upload and share their commits with other collaborators.



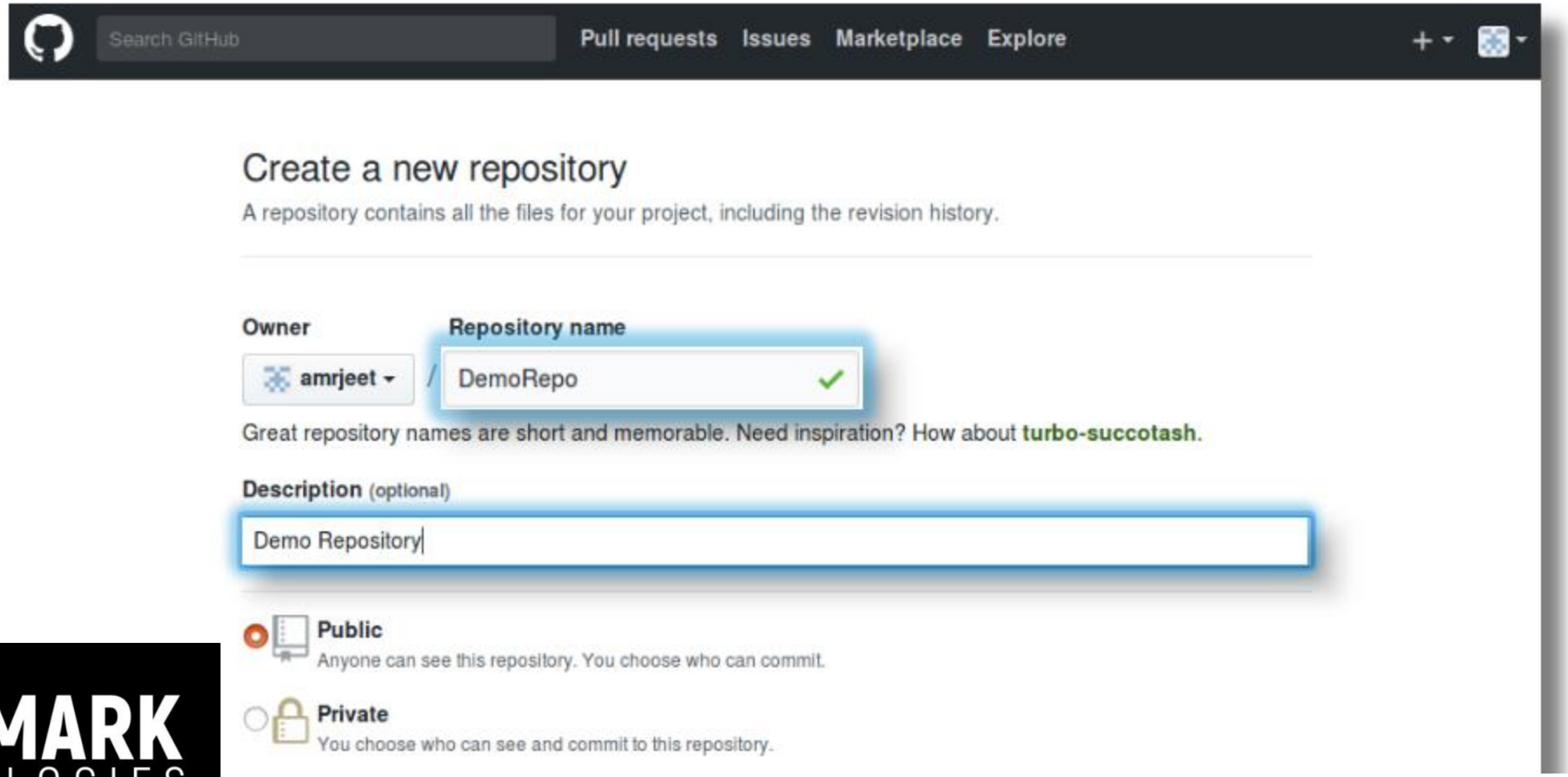
Creating A Remote Repository: New Repository

- Sign-up at **github.com**
- Click on New repository to create a new repository



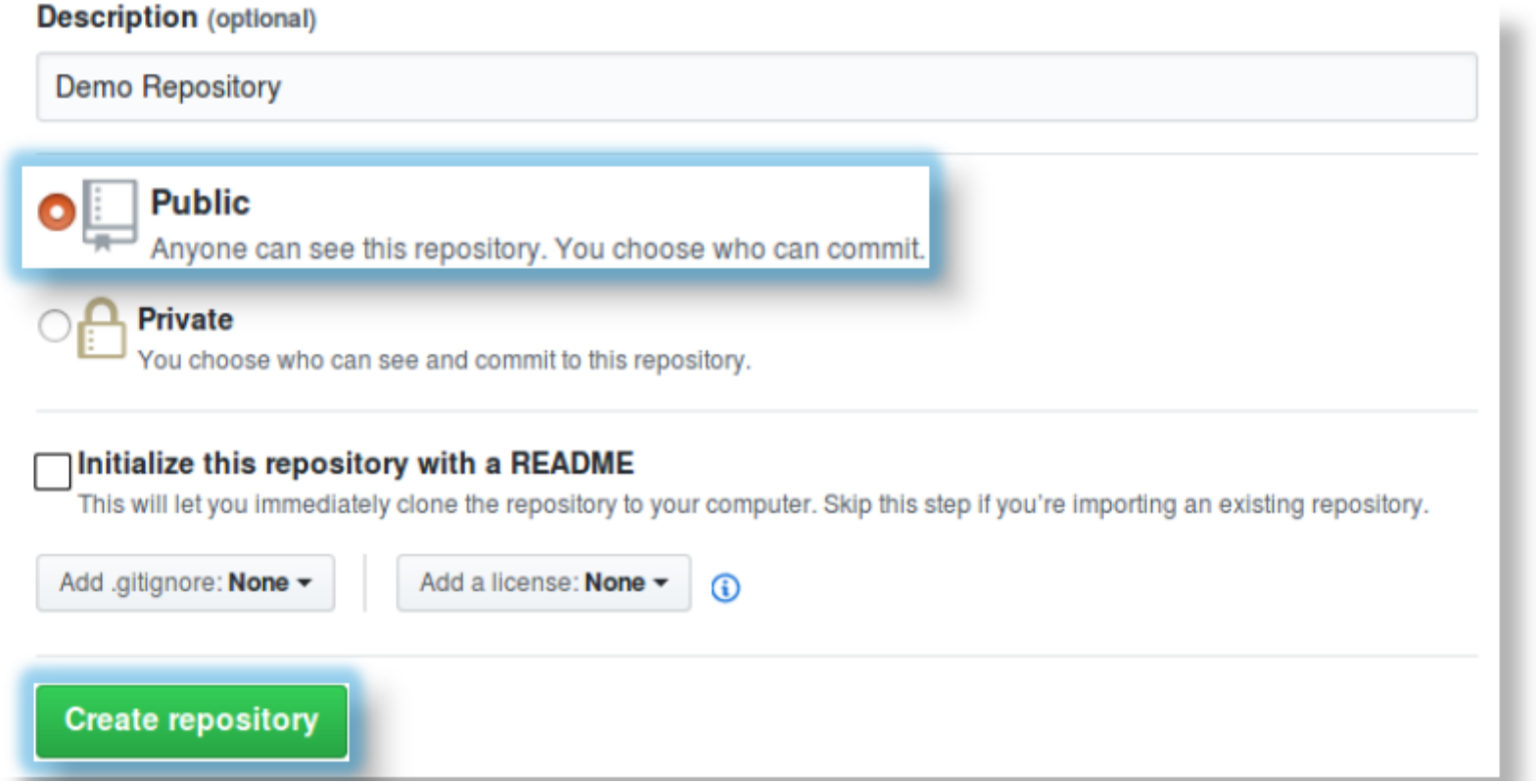
Creating A Remote Repository: Adding Description

- Under **Repository name**, give a name to your repository
- Give some Description about your repository under **Description** section.



Creating A Remote Repository: Create Repository

- For a free repository choose public
- For a private repository a monthly premium needs to be paid
- Finally click on Create Repository

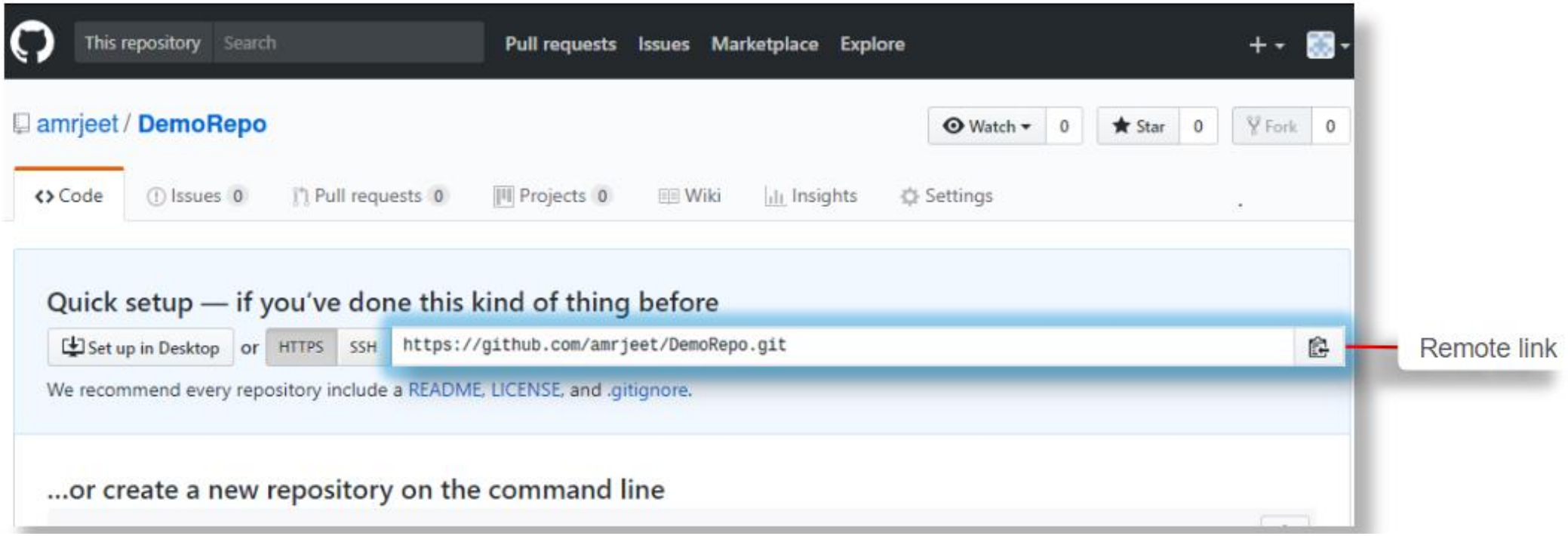


Adding Remote To Local

To add Remote repository to local use **git add remote** followed by remote link

```
Syntax: git add remote origin <remote link>
```

```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git remote add origin https://github.com/amrjeet/DemoRepo.git
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```



Push Local Repository To Remote

To push **Local repository** to remote use **push** command

```
Syntax: git push origin master
```

Origin is used as an alias for your remote

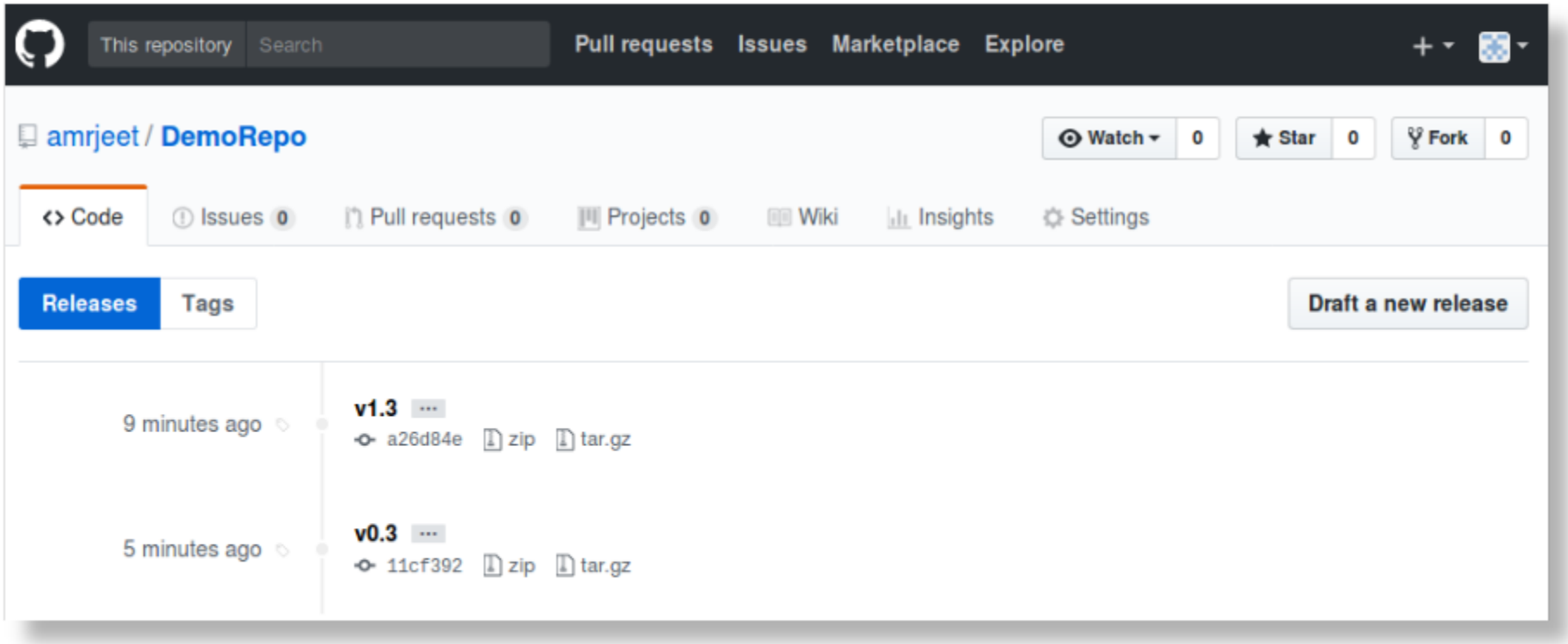
```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git push origin master
Username for 'https://github.com': amrjeet
Password for 'https://amrjeet@github.com':
Counting objects: 11, done.
Compressing objects: 100% (10/10), done.
Writing objects: 100% (11/11), 1.61 KiB | 0 bytes/s, done.
Total 11 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), done.
To https://github.com/amrjeet/DemoRepo.git
 * [new branch]      master -> master
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```

Refers to master branch in local repo

Pushing Tags

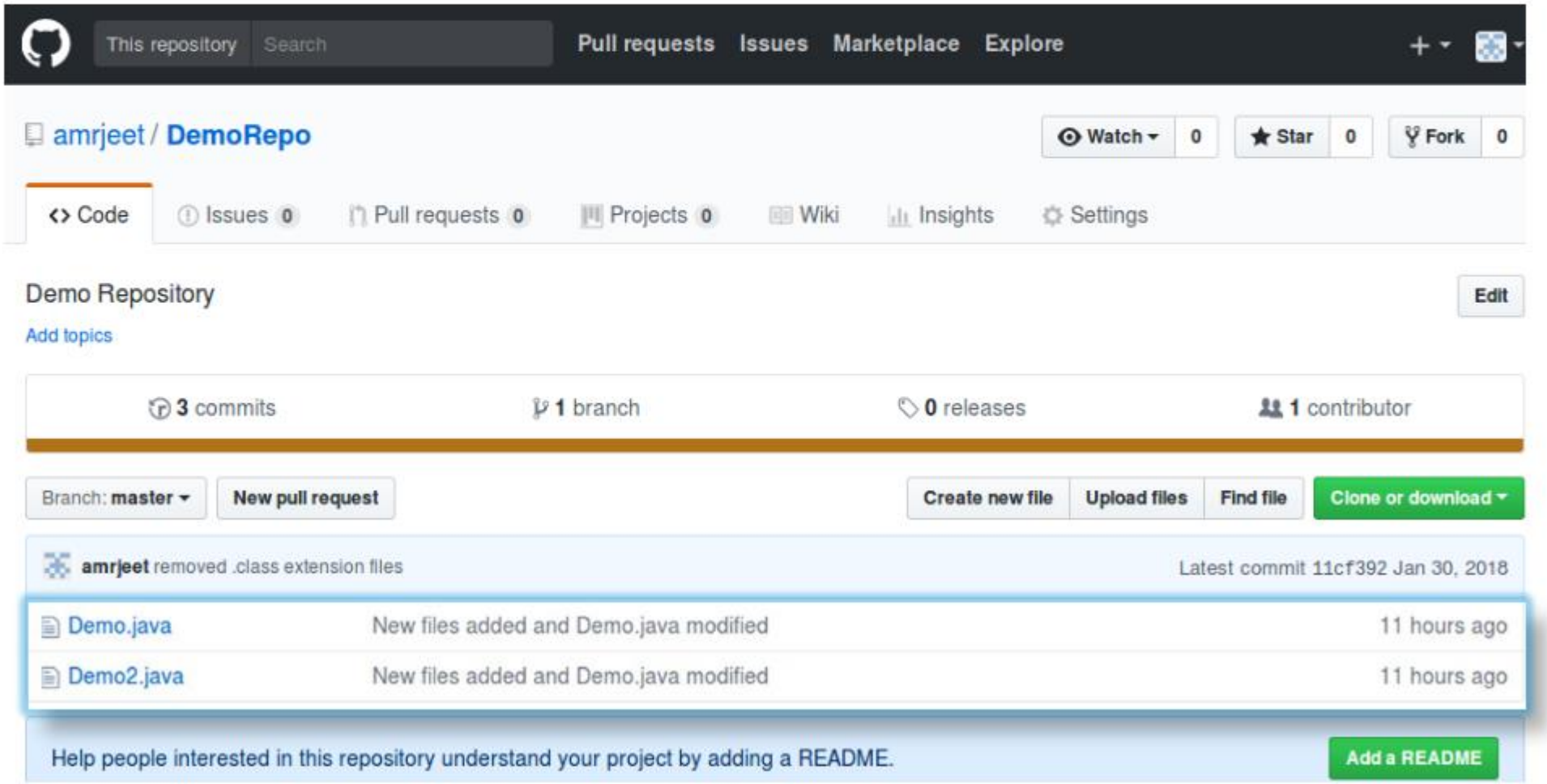
Tags can be pushed, viewed and shared on Remote

```
Syntax: git push origin --tags
```



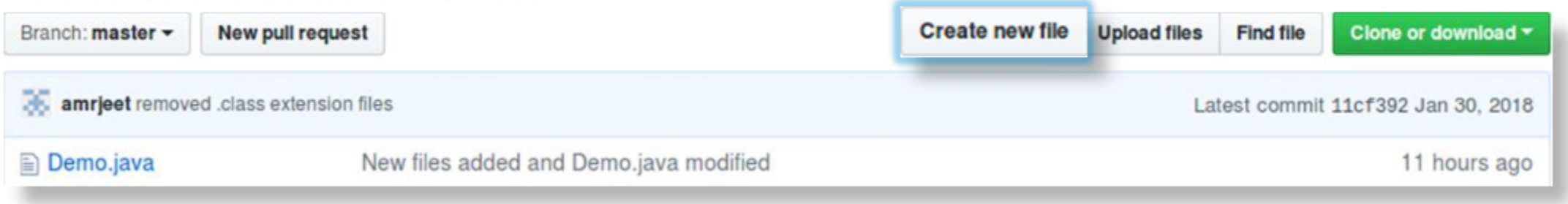
Push Local Repository To Remote

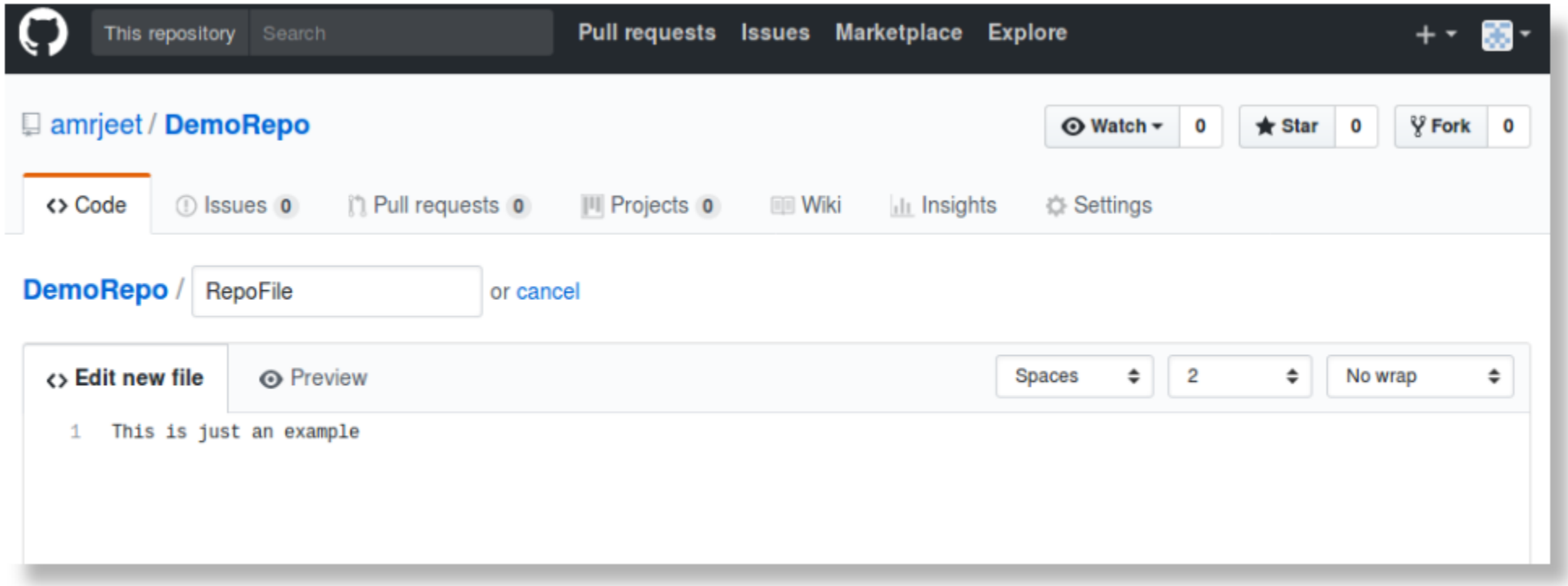
The changes can be seen in Remote repository



Working On Remote

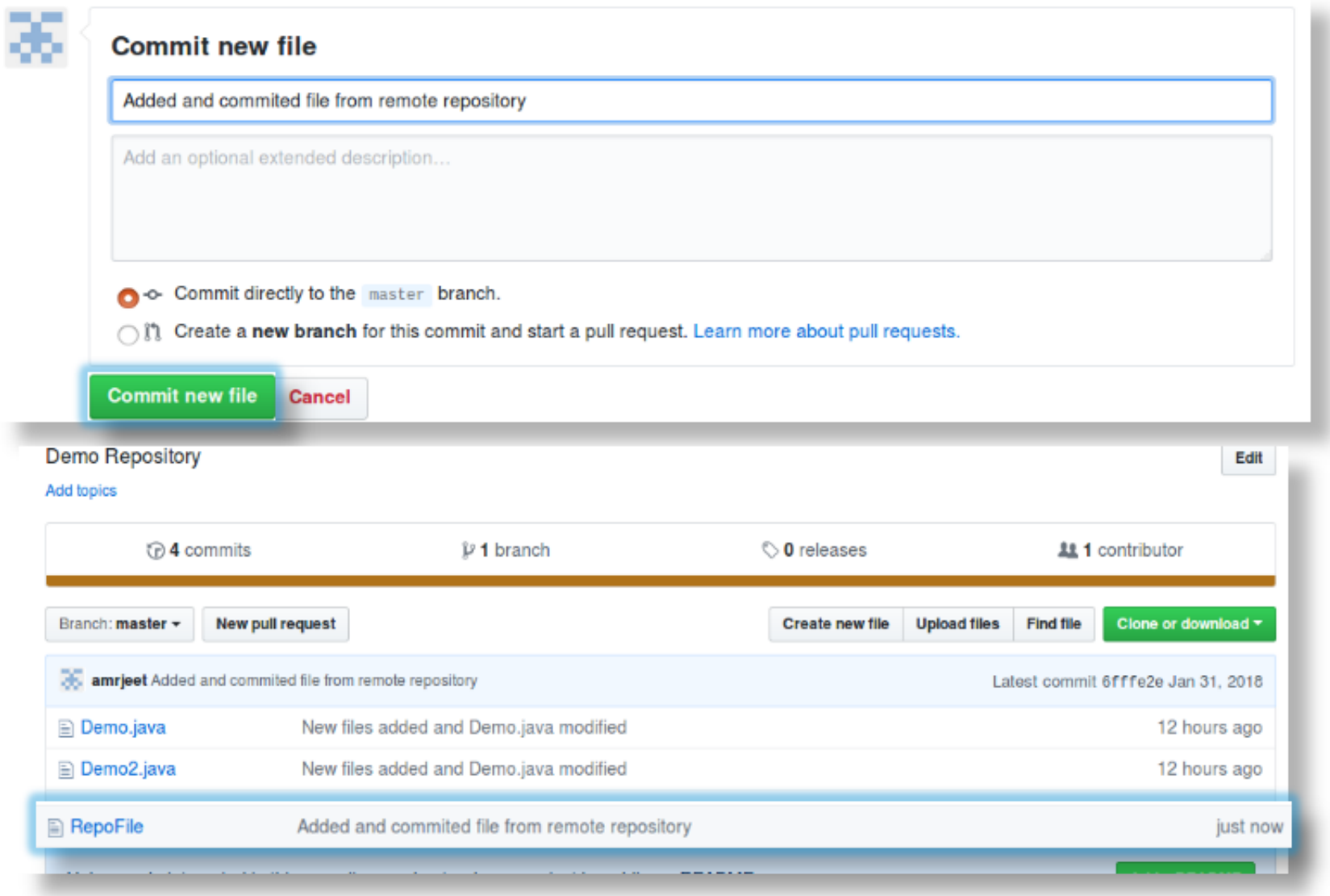
Files can be created and edited on remote





Working On Remote

These files can then be committed on the remote



Remote List

To list all the remotes attached to your Local repository

```
Syntax: git remote -v
```

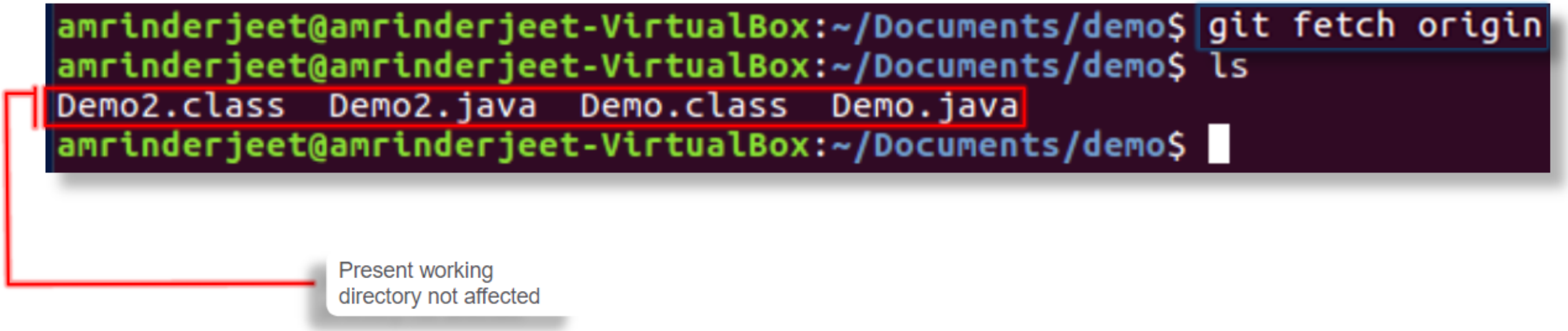
```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git remote -v
origin  https://github.com/amrjeet/DemoRepo.git (fetch)
origin  https://github.com/amrjeet/DemoRepo.git (push)
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```

Fetch

- **Fetch** command copies the changes from remote to local repository

```
Syntax: git fetch origin
```

- Fetch **does not** affect the present working directory



Pull

- Pull copies all the changes from remote to local repository
- It then merges the changes with the present working directory

```
Syntax: git pull origin
```

```
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ git pull origin
From https://github.com/amrjeet/DemoRepo
 * branch            HEAD       -> FETCH_HEAD
Updating 11cf392..6fffe2e
Fast-forward
 RepoFile | 1 +
 1 file changed, 1 insertion(+)
 create mode 100644 RepoFile
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$ ls
Demo2.class  Demo2.java  Demo.class  Demo.java  RepoFile
amrinderjeet@amrinderjeet-VirtualBox:~/Documents/demo$
```

Working directory merged with pulled repository

.

Thanks.