SUBJECT NAME: Source Code Management
CLUSTER: Beta

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Submit to: Mr. Mohit Kapoor

1. Setting Up Git Client

What is Git?

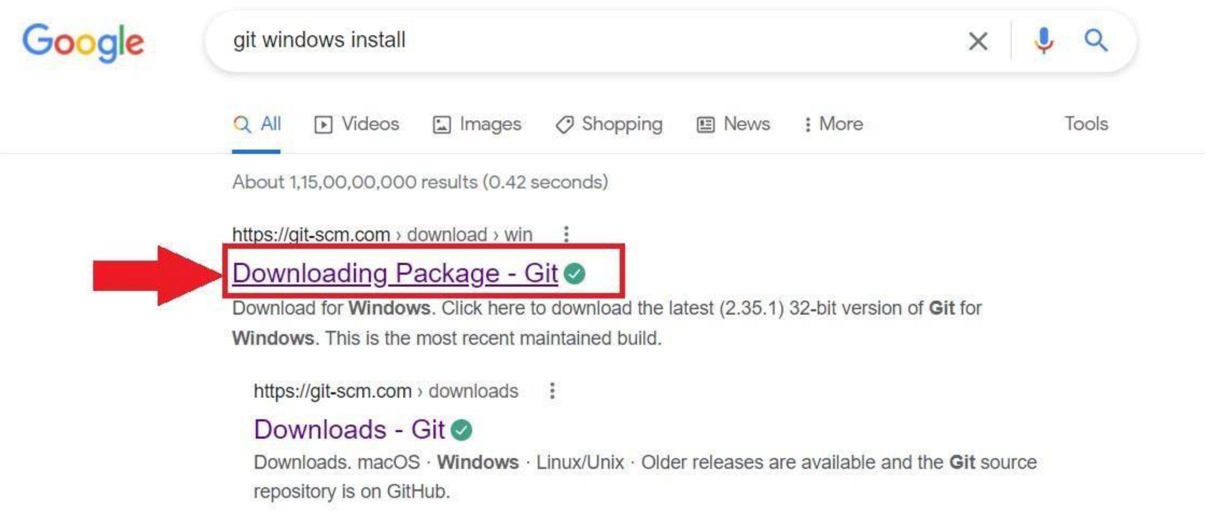
Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Why we need Git?

Git tracks the changes you make to files, so you have a record of what has been done, and you can revert to specific versions should you ever need to. Git also makes collaboration easier, allowing changes by multiple people to all be merged into one source.

Installing Git on Windows

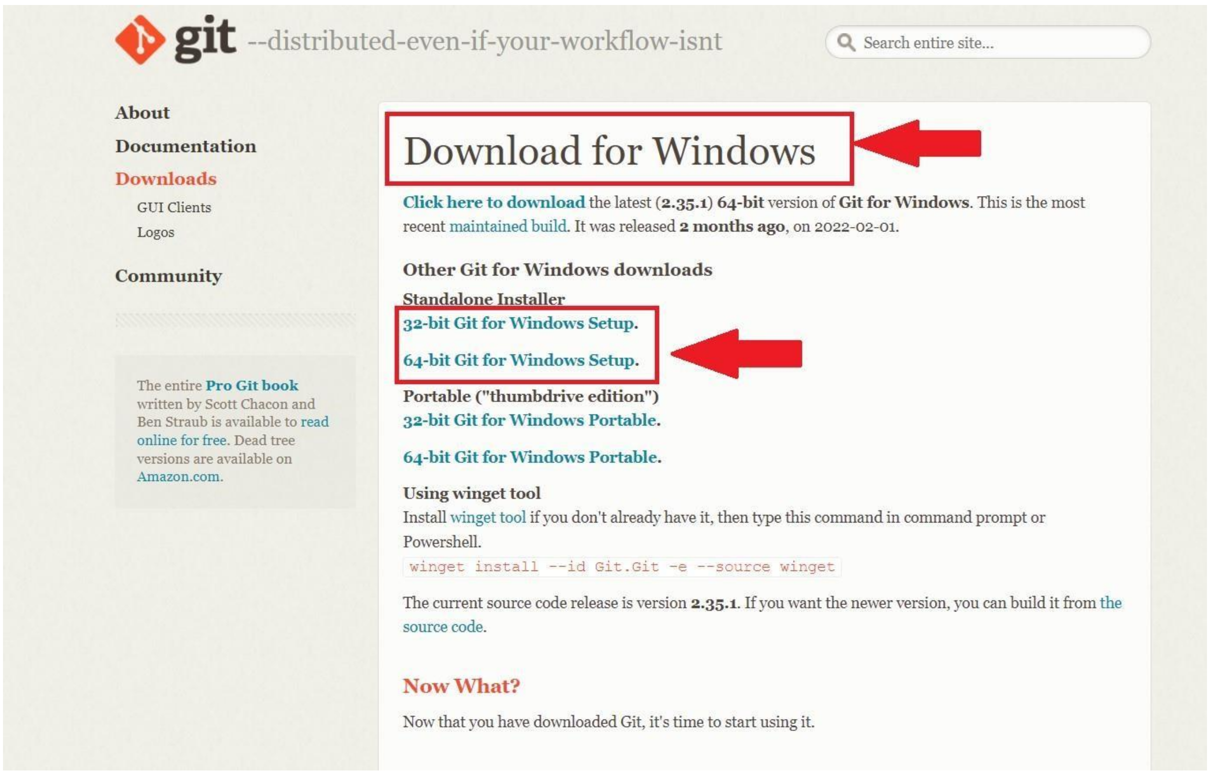
Download and install the latest version of Git for Windows.



About 1,15,00,00,000 results (0.42 seconds)

https://git-scm.com › download › win
Downloading Package - Git
Download for Windows. Click here to download the latest (2.35.1) 32-bit version of Git for Windows. This is the most recent maintained build.

https://git-scm.com › downloads
Downloads - Git
Downloads. macOS · Windows · Linux/Unix · Older releases are available and the Git source repository is on GitHub.



The entire **Pro Git book** written by Scott Chacon and Ben Straub is available to read online for free. Dead tree versions are available on Amazon.com.

Download for Windows

Click here to download the latest (**2.35.1**) **64-bit** version of **Git for Windows**. This is the most recent maintained build. It was released **2 months ago**, on 2022-02-01.

Other Git for Windows downloads

Standalone Installer

32-bit Git for Windows Setup.

64-bit Git for Windows Setup.

Portable ("thumbdrive edition")

32-bit Git for Windows Portable.

64-bit Git for Windows Portable.

Using winget tool

Install winget tool if you don't already have it, then type this command in command prompt or Powershell.

```
winget install --id Git.Git -e --source winget
```

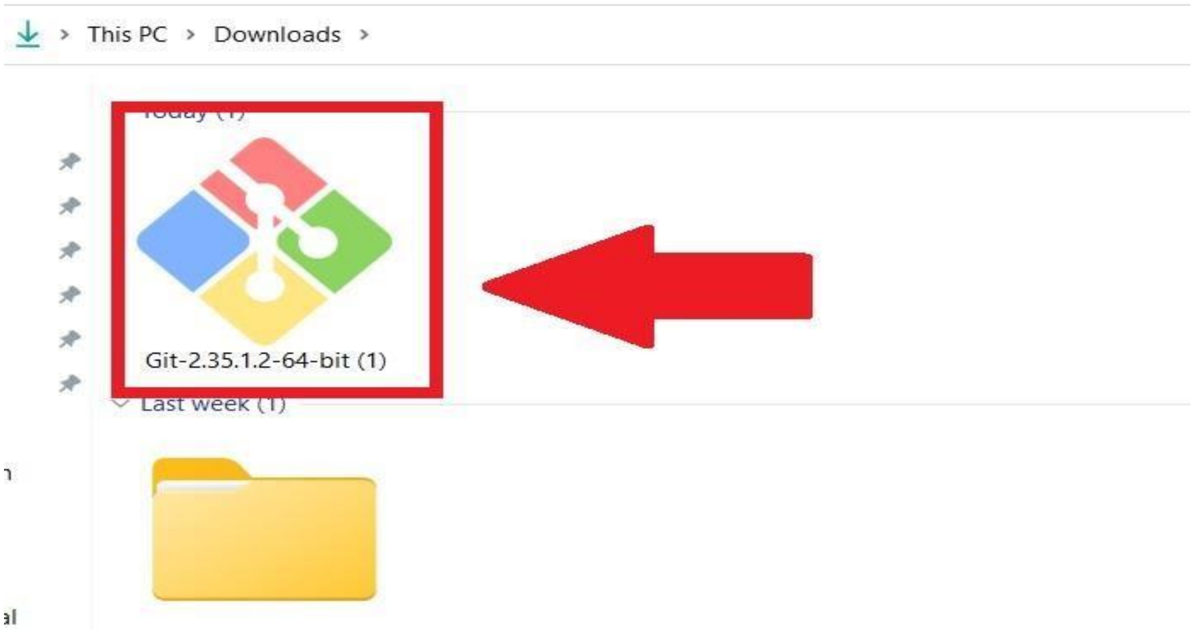
The current source code release is version **2.35.1**. If you want the newer version, you can build it from the source code.

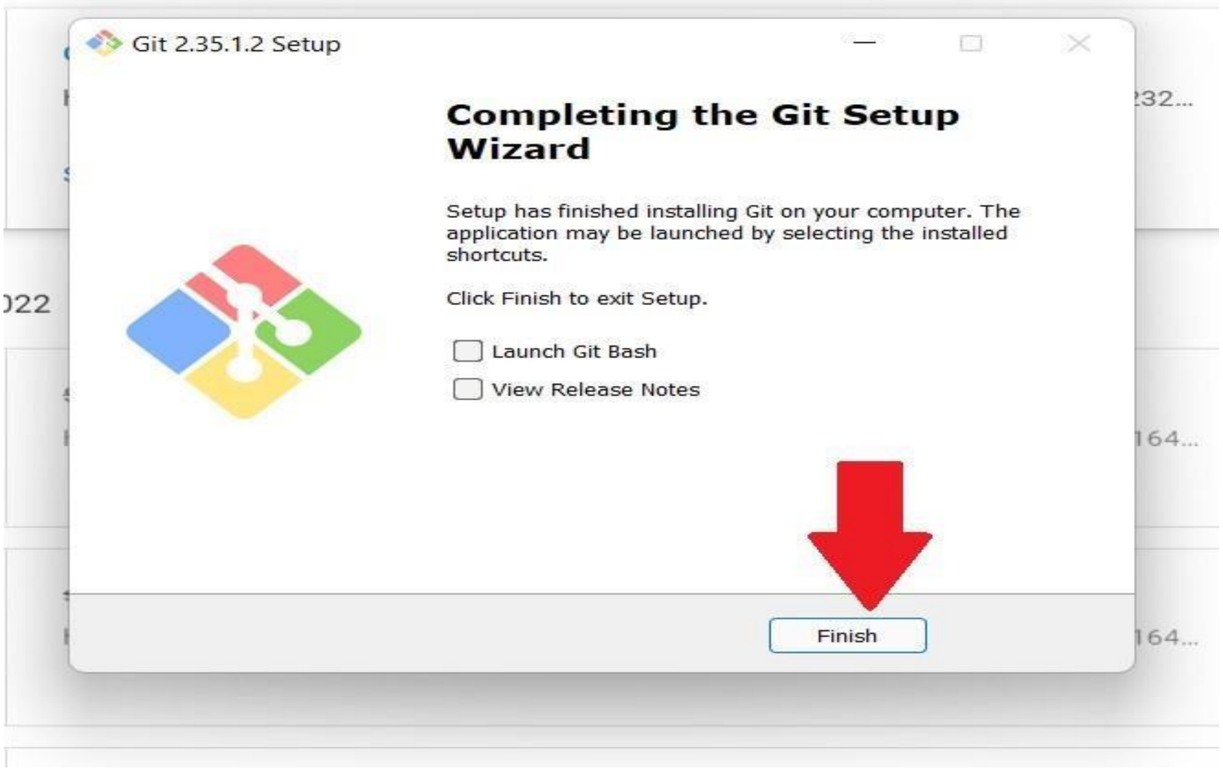
Now What?

Now that you have downloaded Git, it's time to start using it.

Launch Git Installer

Go to **Downloads** in **This PC** and launch the installer.





Git 2.35.1.2 Setup

Completing the Git Setup Wizard

Setup has finished installing Git on your computer. The application may be launched by selecting the installed shortcuts.

Click Finish to exit Setup.

- [ ] Launch Git Bash
- [ ] View Release Notes

2. Setting Up GitHub Account

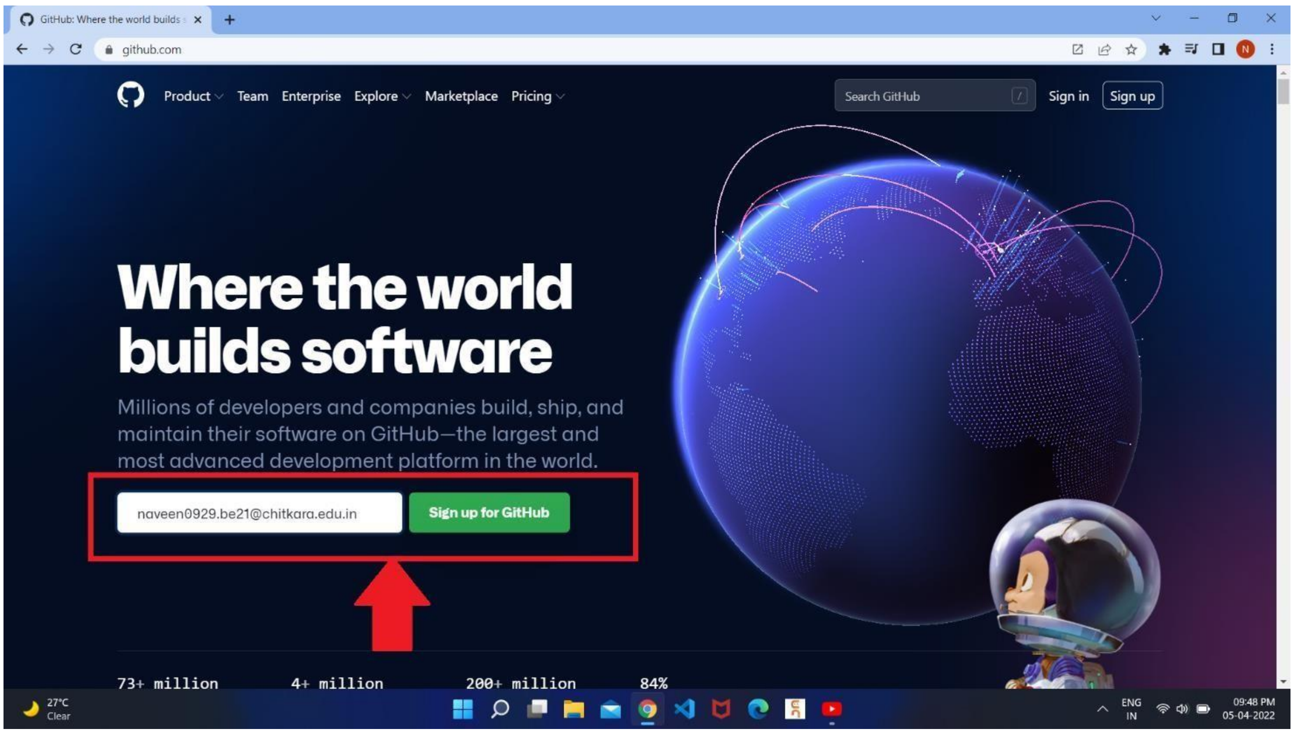
The first steps in starting with GitHub are to create an account, choose a product that fits your needs best, verify your email, set up two-factor authentication, and view your profile.
There are several types of accounts on GitHub. Every person who uses GitHub has their own user account, which can be part of multiple organizations and teams. Your user account is your identity on GitHub.com and represents you as an individual.

1. Creating an account

1. Creating an account

To sign up for an account on GitHub.com, navigate to https://github.com/ and follow the prompts.

- Enter Your Email to Sign up for Git Hub.



Where the world builds software

Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world.

naveen0929.be21@chitkara.edu.in

- To keep your GitHub account secure you should use a strong and unique password.

2. Choosing your GitHub product

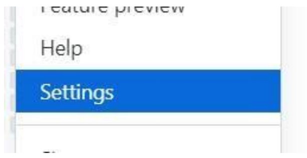
You can choose GitHub Free or GitHub Pro to get access to different features for your personal account. You can upgrade at any time if you are unsure at first which product you want.

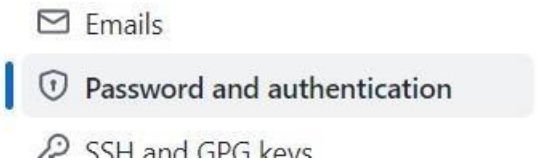
3. Verifying your email address

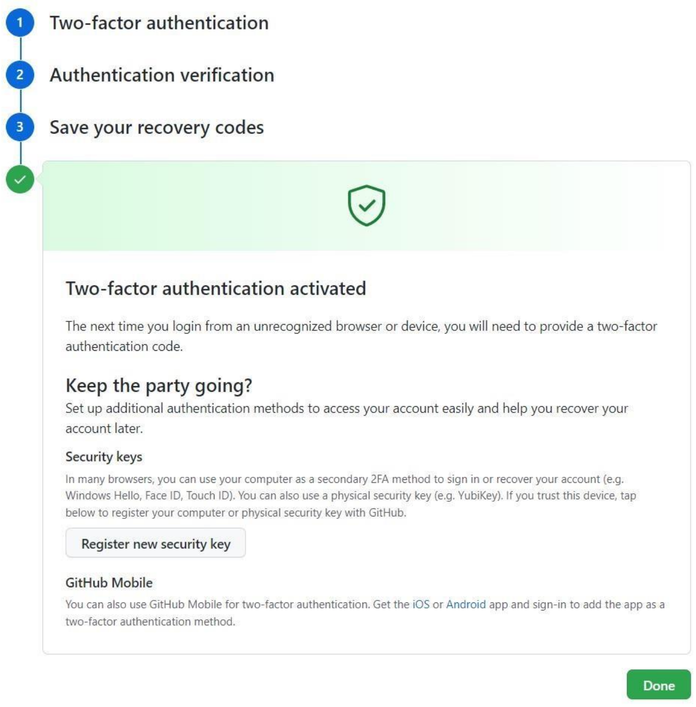
To ensure you can use all the features in your GitHub plan, verify your email address after signing up for a new account.

4. Configuring two-factor authentication

Two-factor authentication, or 2FA, is an extra layer of security used when logging into websites or apps. We strongly urge you to configure 2FA for the safety of your account.







1. Two-factor authentication
2. Authentication verification
3. Save your recovery codes

Two-factor authentication activated

The next time you login from an unrecognized browser or device, you will need to provide a two-factor authentication code.

Keep the party going?

Set up additional authentication methods to access your account easily and help you recover your account later.

Security keys

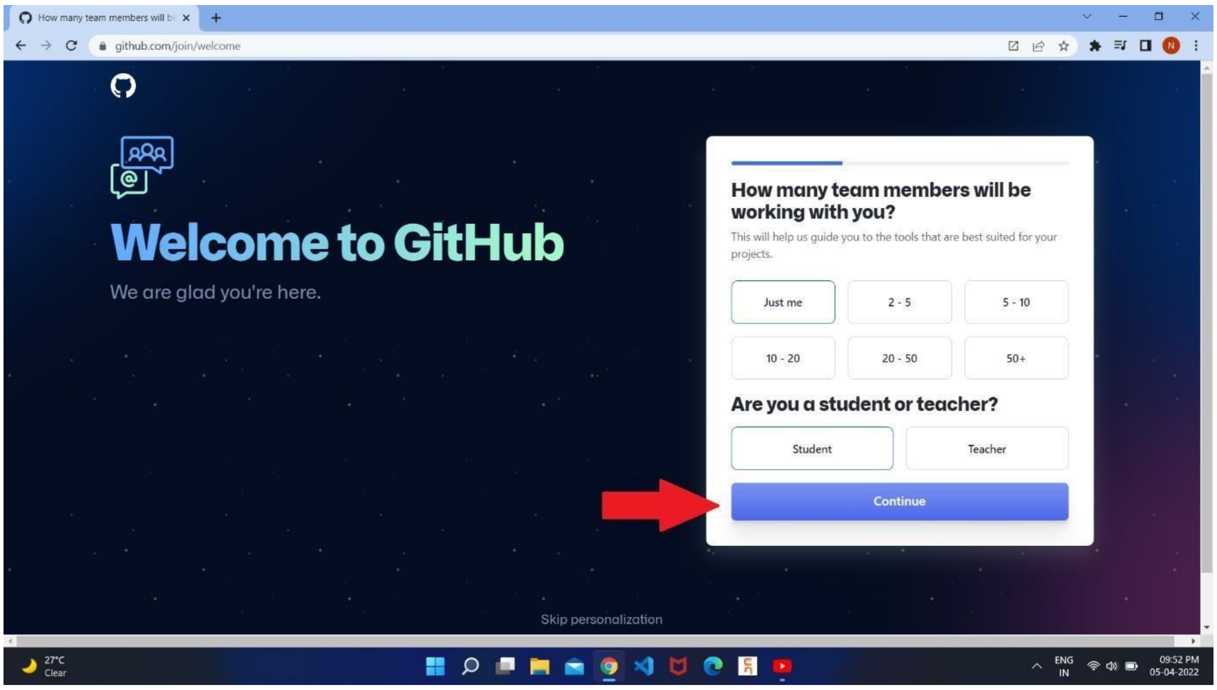
In many browsers, you can use your computer as a secondary 2FA method to sign in or recover your account (e.g. Windows Hello, Face ID, Touch ID). You can also use a physical security key (e.g. YubiKey). If you trust this device, tap below to register your computer or physical security key with GitHub.

GitHub Mobile

You can also use GitHub Mobile for two-factor authentication. Get the iOS or Android app and sign-in to add the app as a two-factor authentication method.

5. Viewing your GitHub profile and contribution graph

Your GitHub profile tells people the story of your work through the repositories and gists you've pinned, the organization memberships you've chosen to publicize, the contributions you've made, and the projects you've created.



How many team members will be working with you?

This will help us guide you to the tools that are best suited for your projects.

Are you a student or teacher?

Collaborating on GitHub

Any number of people can work together in repositories across GitHub. You can configure settings, create project boards, and manage your notifications to encourage effective collaboration.

1. Working with repositories

Creating a repository

A repository is like a folder for your project. You can have any number of public and private repositories in your user account. Repositories can contain folders and files, images, videos, spreadsheets, and data sets, as well as the revision history for all files in the repository.

When you create a new repository, you should initialize the repository with a README file to let people know about your project.

2. Importing your projects

If you have existing projects, you'd like to move over to GitHub you can import projects using the GitHub Importer, the command line, or external migration tools.

3. Managing collaborators and permissions

You can collaborate on your project with others using your repository's issues, pull requests, and project boards. You can invite other people to your repository as collaborators from the **Collaborators** tab in the repository settings.

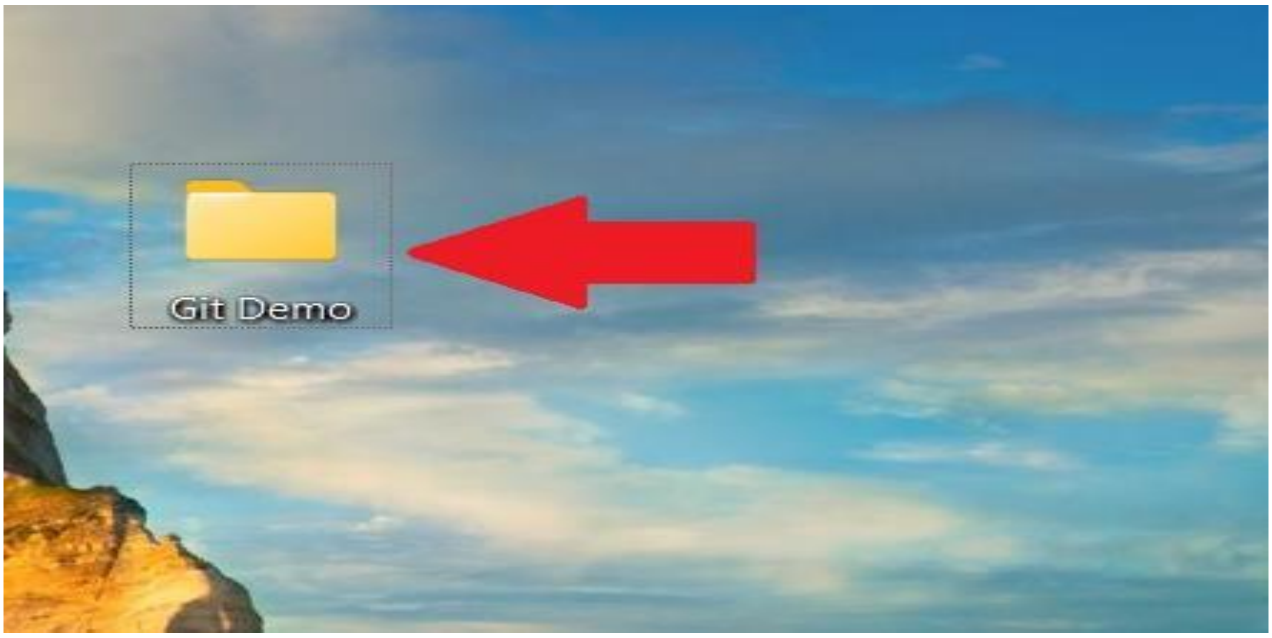
You are the owner of any repository you create in your user account and have full control of the repository. Collaborators have written access to your repository, limiting what they have permission to do.

4. Managing repository settings

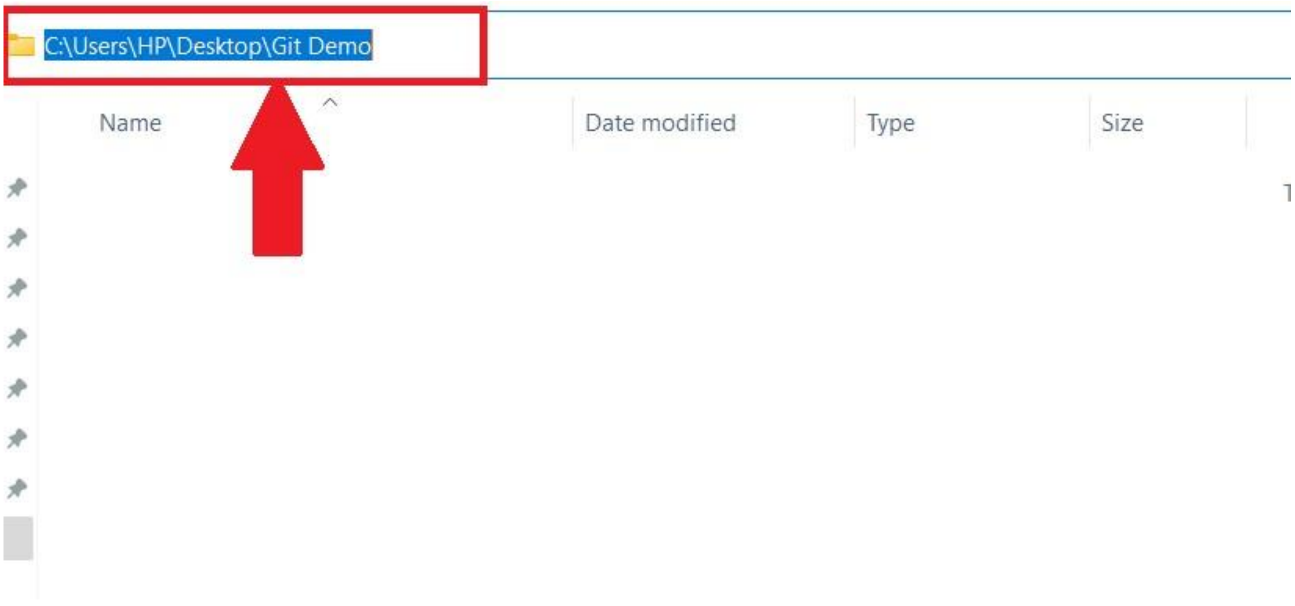
As the owner of a repository you can configure several settings, including the repository's visibility, topics, and social media preview.

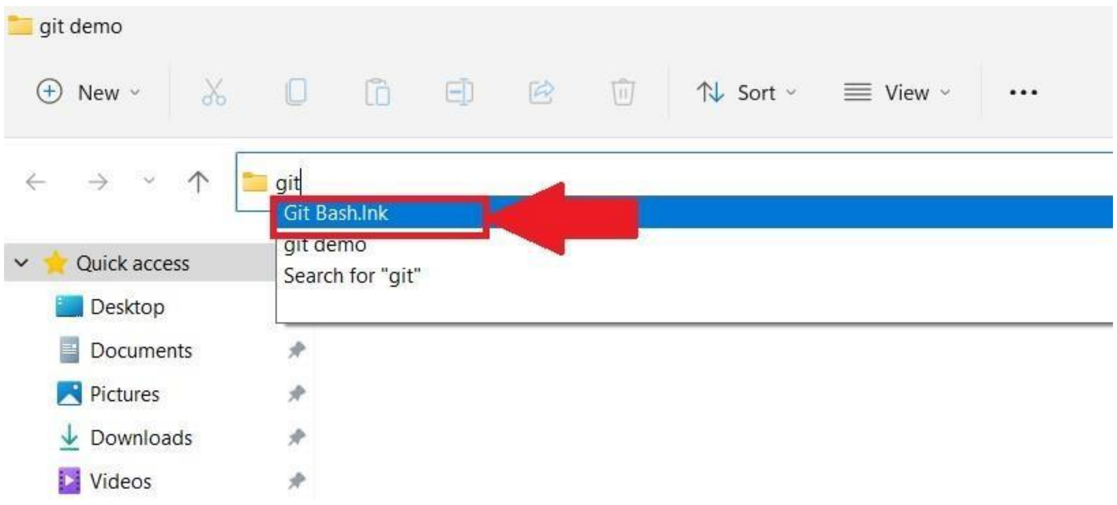
3. Generate Logs

- Create a New Folder (Empty Folder).

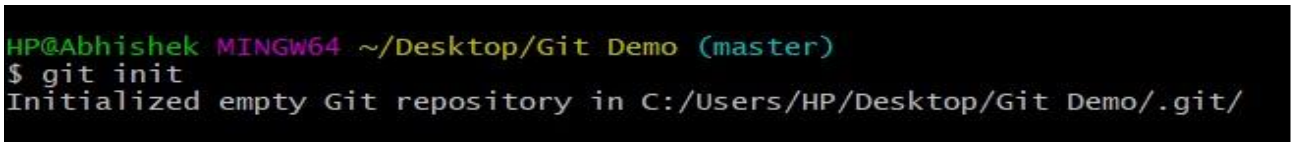


- Go to location and Type Git Bash.lnk (It will AutoComplete it after writing Git) and Click on it.





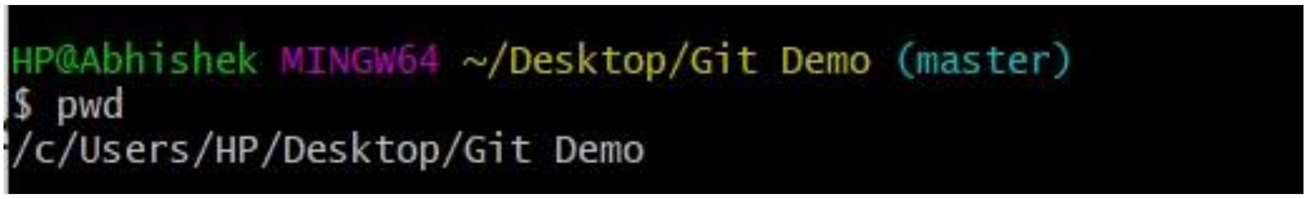
- It will open Git Bash Terminal Or Git Bash CLI(Command Line Interface).
- Now we have to write all the Commands in this CLI.
- On CLI Type “Git init.”
- **git init :** *The git init command creates a new git repository. It can be used to convert an existing, unversioned project to a Git repository or initialized a new empty repository.*



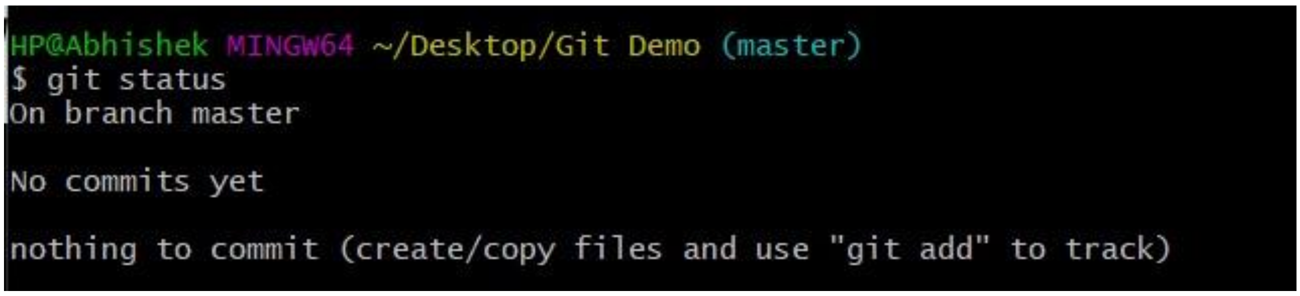
```
HP@Abhishek MINGW64 ~/Desktop/Git Demo (master)
$ git init
Initialized empty Git repository in C:/Users/HP/Desktop/Git Demo/.git/
```

- Type “pwd” , “git status” , “mkdir project-1”.

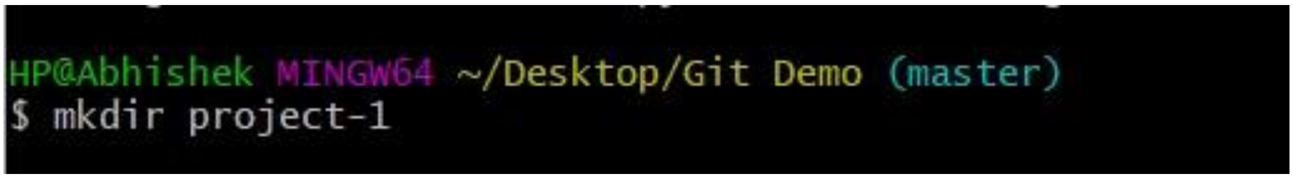
✞ **pwd (Present Work Directory):** *The pwd command writes the full pathname of the current working directory to the standard output.*


```
HP@Abhishek MINGW64 ~/Desktop/Git Demo (master)
$ pwd
/c/Users/HP/Desktop/Git Demo
```

✞ **git status :** *The git status command displays the state of the working directory and the staging area.*

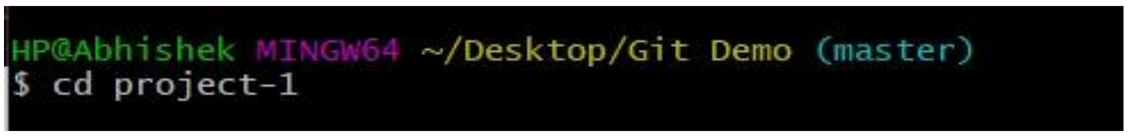

```
HP@Abhishek MINGW64 ~/Desktop/Git Demo (master)
$ git status
On branch master

No commits yet

nothing to commit (create/copy files and use "git add" to track)
```

✞ **mkdir <Directory Name>:** *The mkdir command in CLI allows users to create or make new directories.*

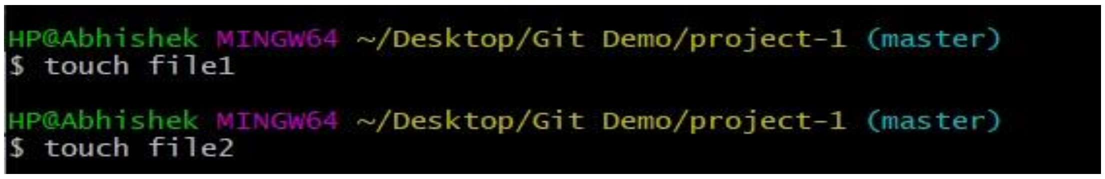

```
HP@Abhishek MINGW64 ~/Desktop/Git Demo (master)
$ mkdir project-1
```

- Type “cd project-1”, “touch file1”, “touch file2” and “ls”.

✞ **cd <Directory Name>:** *The cd command, also known as chdir (change directory), is a command-line shell command used to change the current working directory in various operating system.*

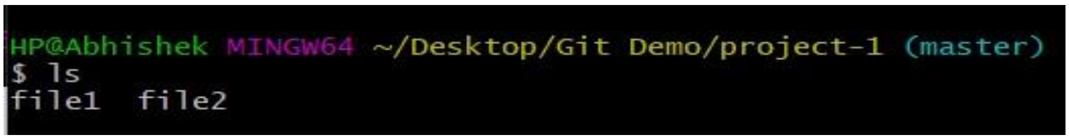

```
HP@Abhishek MINGW64 ~/Desktop/Git Demo (master)
$ cd project-1
```

✞ **touch <Filename> :** *The touch command is a standard command which is used to create, change and modify timestamps of a file.*



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ touch file1

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ touch file2
```

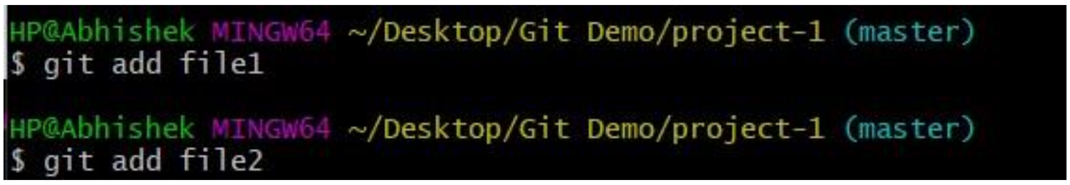
✞ **ls :** *The ls command is used to list files or directories in Linux and other Unix-based operating systems.*



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ ls
file1  file2
```

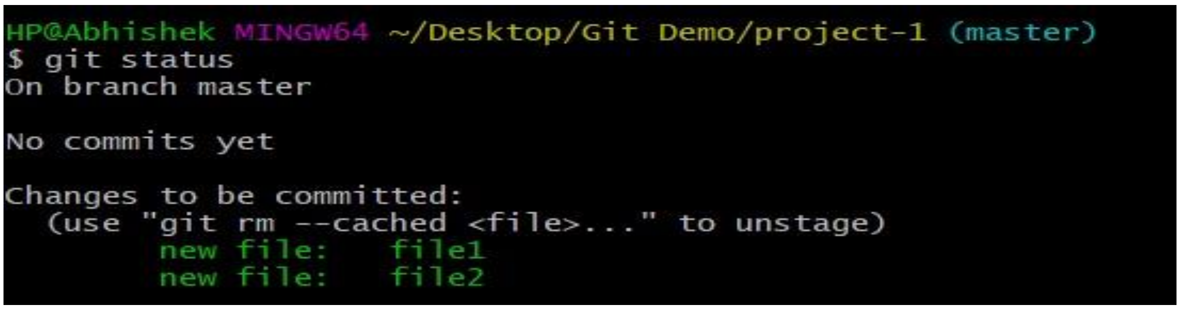
- Type “git add -A” or git add <filename> (git add file1) and Check status using “git status” Command.

✞ **git add <filename> :** *The git add command adds a file to the Git staging area. This area contains a list of all the files you have recently changed.*


```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git add file1

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git add file2
```

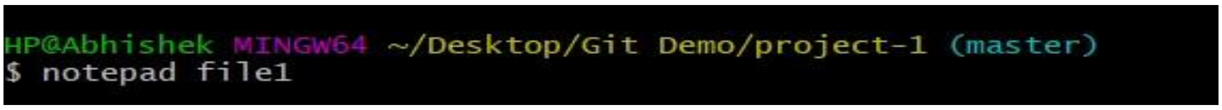
- ***git add -A :*** *This command adds every change we made to files and folders from our repository to the Git staging area.*

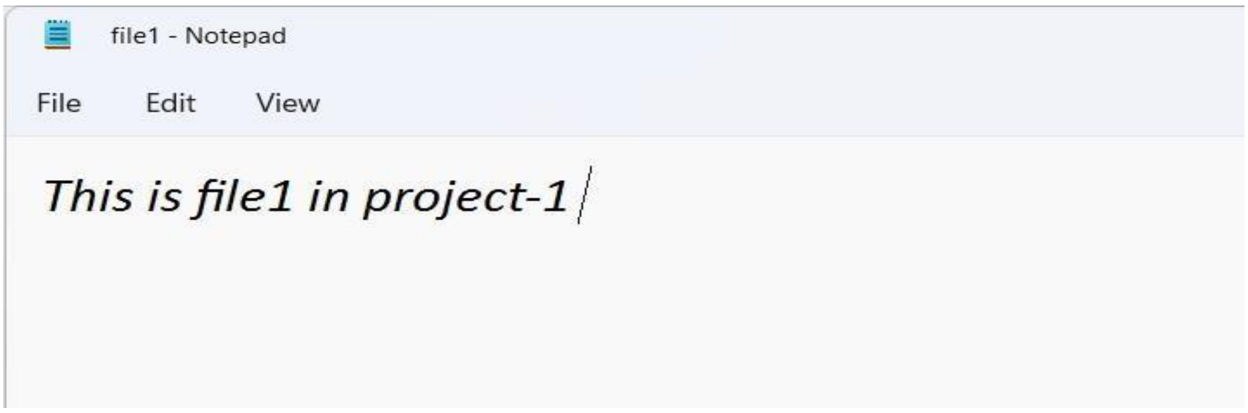
- Now check git status, files are staged.


```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git status
On branch master

No commits yet

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

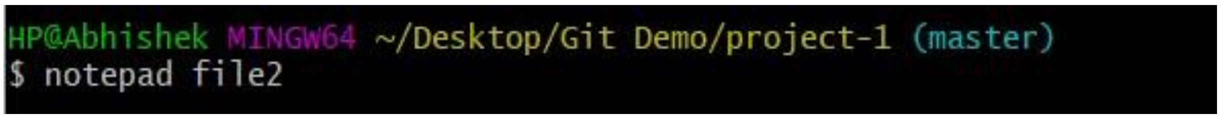
After Adding the files in Stagging area. Our Files are now ready to commit.

- Open the Files in any editor like: “Notepad” and “VS code” and do changes in it and save it. You can also open file in notepad by command : **notepad <filename>**

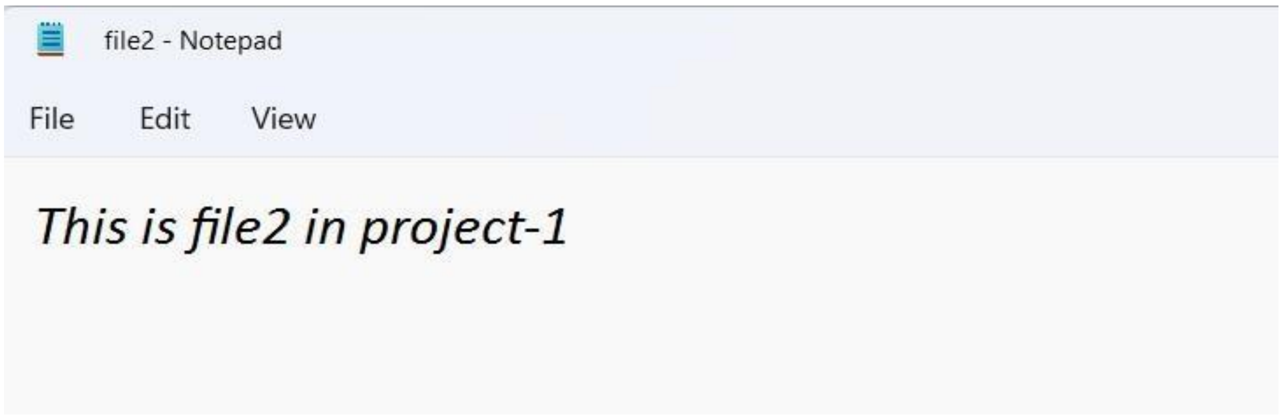

```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ notepad file1
```



This is file1 in project-1

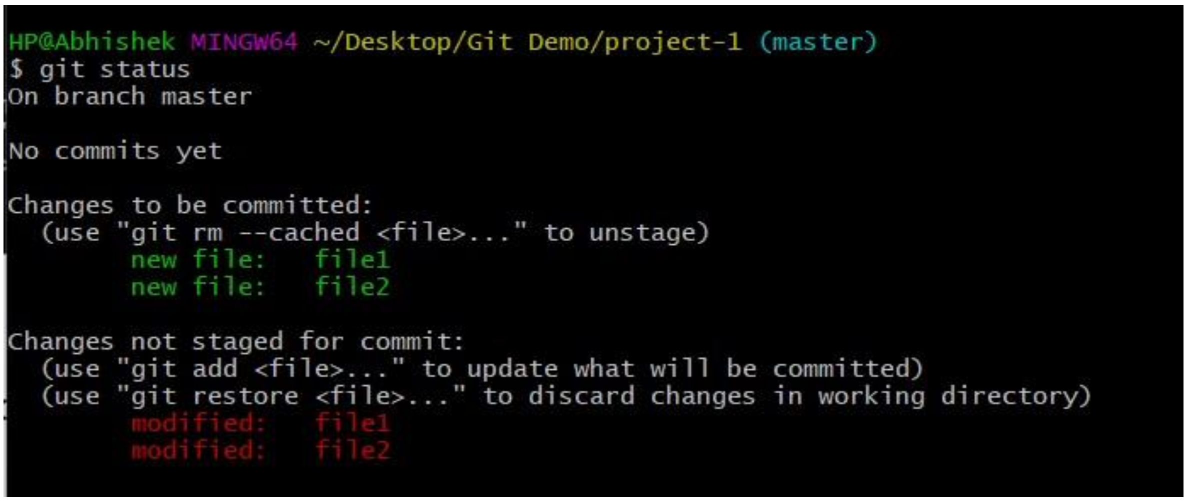


```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ notepad file2
```



This is file2 in project-1

- Now Check the Status by using Command “git status” in CLI.



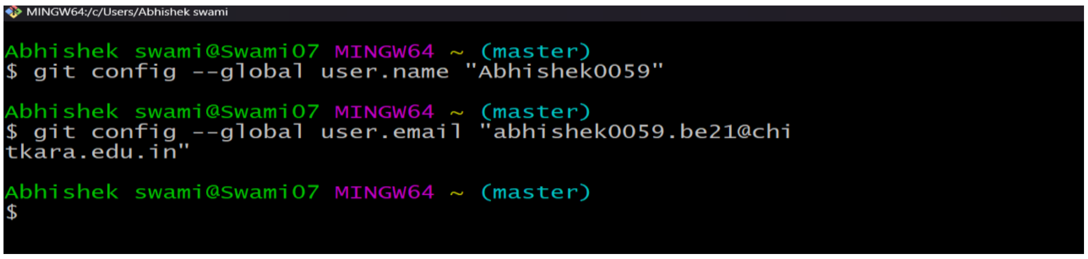
```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git status
On branch master

No commits yet

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

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
        modified:   file2
```

- The Files are modified, we need to add these modified files in staging area again to do Commits.

- Before Commit we need to give our username and email. This setup only needs to be done once on your computer. And this Can be done by using Command :

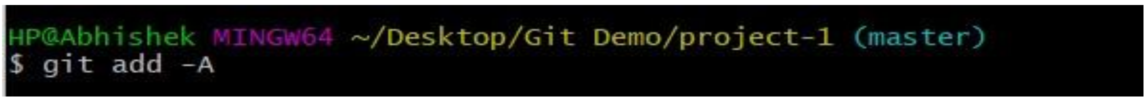
For UserName : ***git config --global user.name "UserName".***

For UserEmail : ***git config --global user.email "UserEmail".***



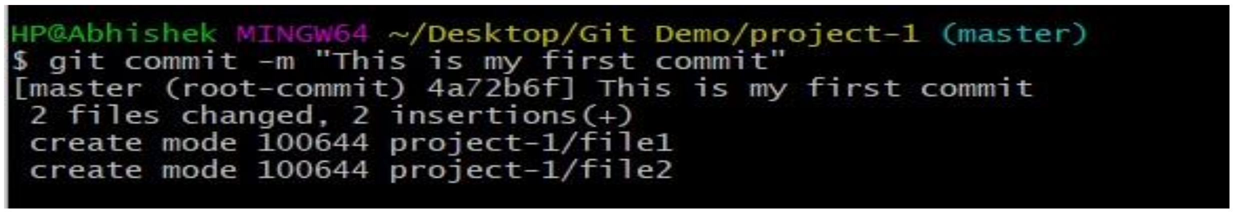
```
MINGW64:/c/Users/Abhishek swami

Abhishek swami@Swami07 MINGW64 ~ (master)
$ git config --global user.name "Abhishek0059"

Abhishek swami@Swami07 MINGW64 ~ (master)
$ git config --global user.email "abhishek0059.be21@chi
tkara.edu.in"

Abhishek swami@Swami07 MINGW64 ~ (master)
$
```

- Type Command "git add -A" in CLI to add files in staging area. And Type "git commit -m "This is my first Commit".



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git add -A
```

- git commit -m < “The Message To Commit”>: The git commit command captures a snapshot of the project’s currently staged changes. Committed snapshots can be thought of as “safe” versions of a project –Git will never change them unless you explicitly ask it to.



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git commit -m "This is my first commit"
[master (root-commit) 4a72b6f] This is my first commit
 2 files changed, 2 insertions(+)
 create mode 100644 project-1/file1
 create mode 100644 project-1/file2
```

- Now Check Status and type Command “git log” in CLI.

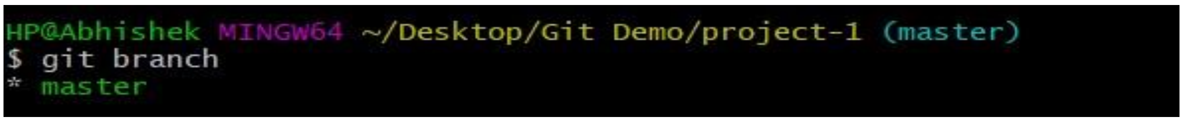
✞ **git log :** *Git log is a utility tool to review and read a history of everything that happens to a repository.*

4. Create and Visualize Branches

A branch is a version of the repository that diverges from the main working project. It is a feature available in most modern version control systems. A Git project can have more than one branch. These branches are a pointer to a snapshot of your changes. When you want to add a new feature or fix a bug, you spawn a new branch to summarize your changes.

The master branch is a default branch in Git.

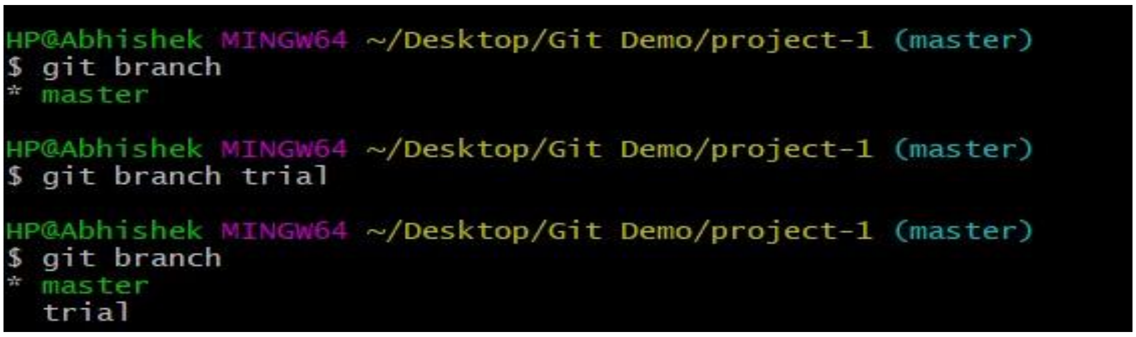
Use "**git branch**" command, which gives us List of all branches in our Repository. If the branch name is in Green Colour, it show the branch in which you are.



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git branch
* master
```

- Write command "**git branch trial**" on CLI.

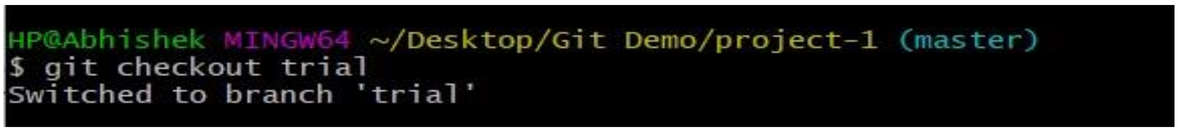
- ***git branch <branch name> :*** *This Command Allow us to make a new Branch (which is Copy of Master branch).*



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git branch
* master

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git branch trial

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git branch
* master
  trial
```

- Type "git checkout trial".

✞ ***git Checkout <branch name> :*** *This command allow us to Switch to another Branch (i.e.) trial.*

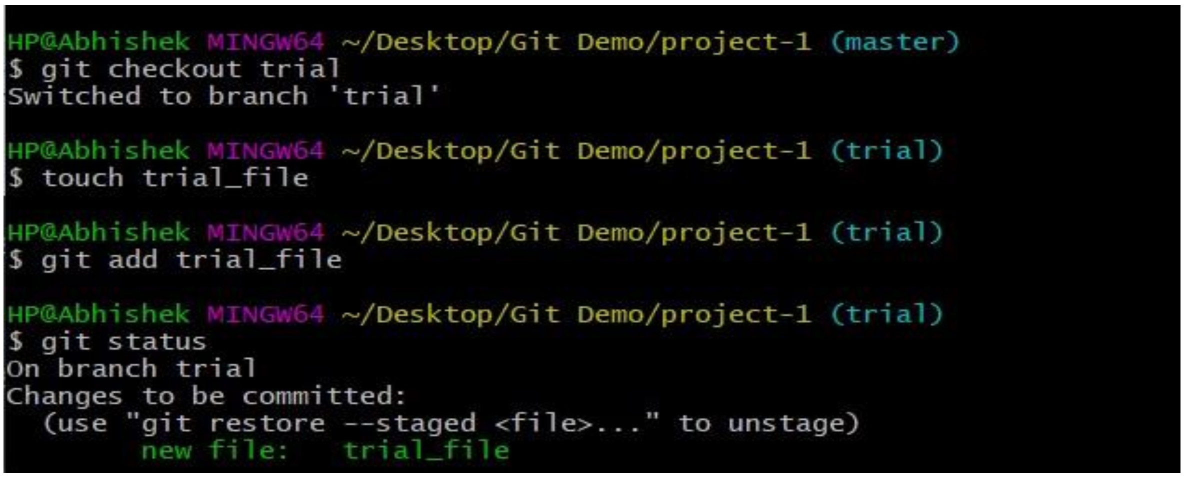


```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git checkout trial
Switched to branch 'trial'
```

The trial branch is the copy of Master branch. It contains all the Commits done in master branch.

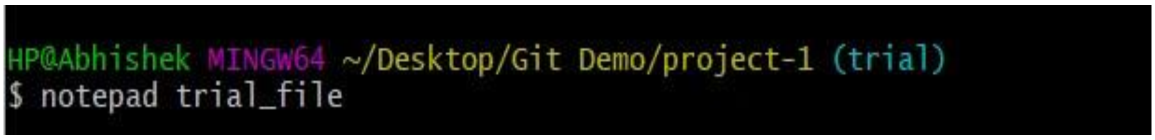
If we do changes in the trial branch it will not affect our master branch.

- Creating a new file “trial_file” in trial branch and add it in staged area.

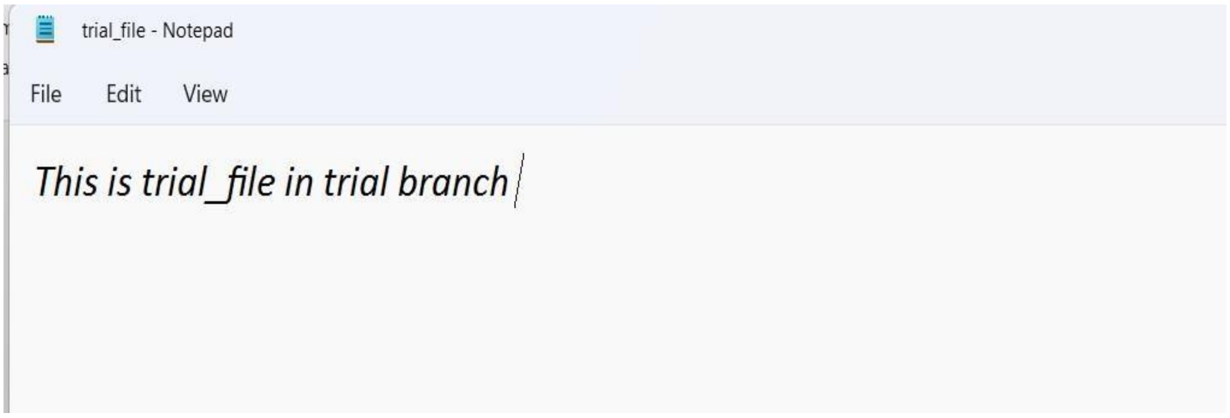


```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (master)
$ git checkout trial
Switched to branch 'trial'

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ touch trial_file

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ git add trial_file

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ git status
On branch trial
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        new file:   trial_file
```

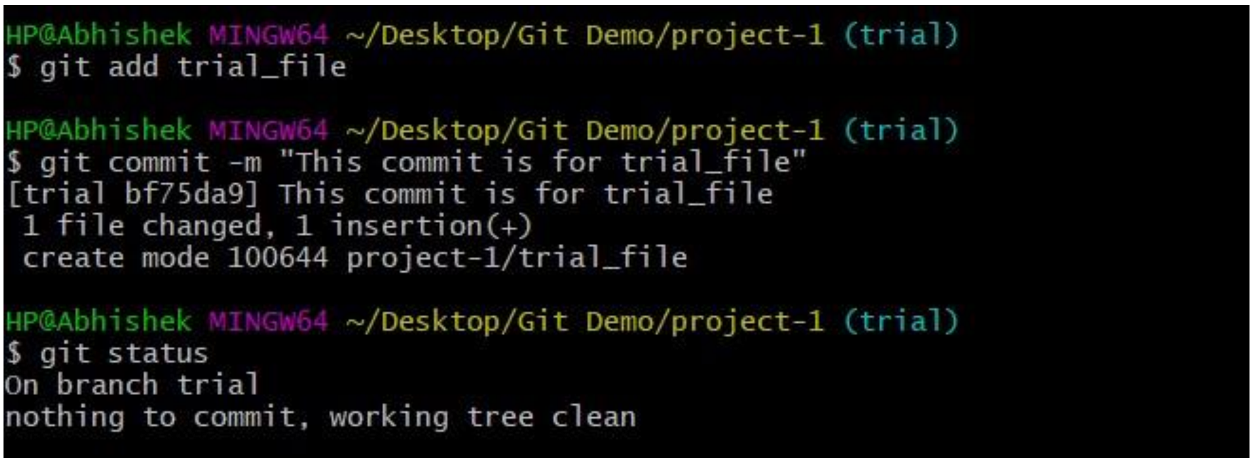
- Do changes in the “trial_file” and commit it.



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ notepad trial_file
```



This is trial_file in trial branch



```
HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ git add trial_file

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ git commit -m "This commit is for trial_file"
[trial bf75da9] This commit is for trial_file
 1 file changed, 1 insertion(+)
 create mode 100644 project-1/trial_file

HP@Abhishek MINGW64 ~/Desktop/Git Demo/project-1 (trial)
$ git status
On branch trial
nothing to commit, working tree clean
```

We can see that after switching to master branch and check git log, it doesn't show "trial" and only shows the commit done in master branch.

Its means newly created branch doesn't have impact on master branch. If we do changes in the branch it will not affect our data in the master branch.

If the change or added data in new branch is correct and you have to merge that data in master branch then,

- On CLI, first switch to master branch.
- Type Command "**git merge trial".**

✞ ***git merge <branch Name> :*** *It merge the branch into another branch.*

The changes or added data merge in master branch.

5. Git Lifecycle Description

Files in a ***Git*** project have various stages like ***Creation, Modification, Refactoring***, and ***Deletion*** and so on. Irrespective of whether this project is tracked by Git or not, these phases are still prevalent. However when a project is under Git version control system, they are present in three major Git states in addition to these basic ones. Here are the three Git states:

1. Working directory
2. Staging area
3. Git directory

These stages are the essence of Git. You get great flexibility in tracking the files due to these stages that files can reside in under Git. Let's understand each of these states one by one.

Working Directory

Consider a project residing in your local system. This project may or may not be tracked by Git. In either case, this project directory is called your Working directory.
Working directory is the directory containing hidden .git folder.
Note: **git init** - Command to initialize a Git repository.
Let's assume that this directory is now tracked by Git. That is we have created a Git repository in this existing project directory. So, a **hidden .git folder** is initialized therein. In this state, Git is just aware of the files in the project. It doesn't track the files yet. .git is the main repository and it keeps all the project history . It can be used to **roll back**, **can fetch the version, saves the snapshots**. Its most important feature is that in it almost **every operation is local** i.e. no internet is needed. GIT has integrity and maintains it.
To track the files, we've to commit these files by first adding the files to the staging area. This brings us to the next state in Git life-cycle.

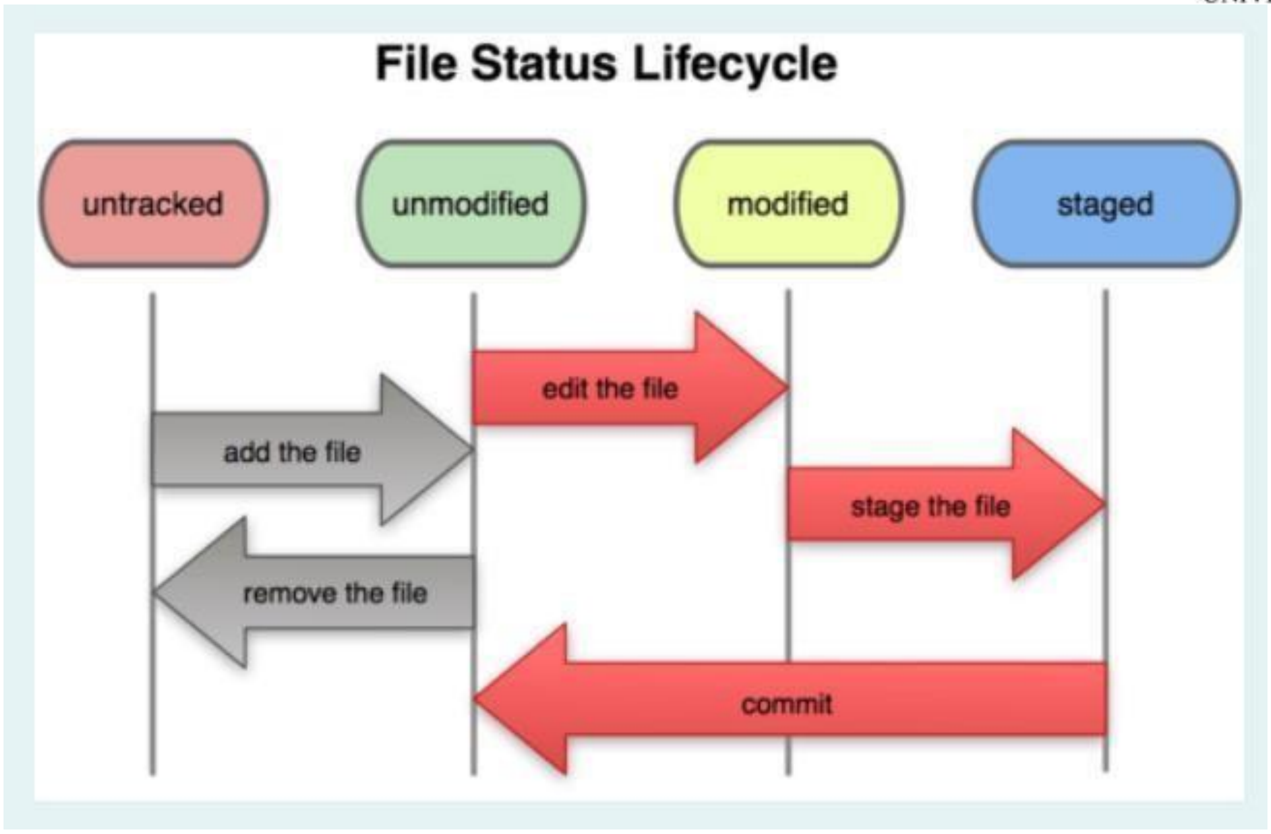
Staging Area

Now, to track the different versions of our files we use the command **git add**. We can term a staging area as a place where different versions of our files are
stored. git add command copies the version of your file from your working directory to the staging area. We can, however, choose which files we need to

add to the staging area because in our working directory there are some files that
we don’t want to get tracked, examples include *node modules, env files, temporary files*, etc. Indexing in Git is the one that helps Git in understanding which files need to be added or sent. You can find your staging area in the .git folder inside the index file.
Currently, the file2 which is a text file here is untracked and so it is red in colour. ***In other words, staging area is the playground where you group, add and organize the files to be committed to Git for tracking their versions.***
Indexing is the process of adding files to the staging area. In other words, index constitutes of files added to the staging area. It is the intermediate stage from where files are passed to be committed and are converted from red colour to green colour.
Note: ***git add*** - Command to add files to staging area.

Git Directory

Now since we have all the files that are to be tracked and are ready in the staging area, we are ready to commit our files using the git commit command. Commit helps us in keeping the track of the metadata of the files in our staging area. We specify every commit with a message which tells what the commit is about. Git preserves the information or the metadata of the files that were committed in a Git Directory which helps Git in tracking files and basically it preserves the photocopy of the committed files. Commit also stores the name of the author who did the commit, files that are committed, and the date at which they are committed along with the commit message.
Thus, Git directory is the database where metadata about project files' history will be tracked.
Note: git commit -m "your message" - Command to commit files to Git repository with message.


File Status Lifecycle
untracked
unmodified
modified
staged
edit the file
add the file
stage the file
remove the file
commit