# GIT AND GITHUB TUTORIAL

## What is Git?

Git is a tool that helps you track changes in your code. You can go back to earlier versions, and see what changed, and who made changes.

## What is GitHub?

GitHub is a website where you can store your Git-tracked code online, share with others, and work together on projects.

## Essential Git Commands

- ### git init

  Starts version control in your folder

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git init
Initialized empty Git repository in C:/Users/shaan/OneDrive/Desktop/Git/.git/
```

- ### git config --global user.name "Your Name"

  Sets your name for all Git commits on this system

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git config --global user.name "Shaan Rout"
```

- ### git config --global user.email "your.email@example.com"

  Sets your email for all commits

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git config --global user.email "shaan.rout.1@gmail.com"
```

- git add file1.txt

  Tells Git to track the file for the next commit

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git add file1.txt
```

- git commit -m "first commit"

  Saves your changes with a message

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git commit -m "first commit"
[master (root-commit) abc123] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 file1.txt
```

- git status

  Shows the state of your working directory

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git status
On branch master
nothing to commit, working tree clean
```

- git log

  Displays history of commits

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git log
commit abc123 (HEAD -> master)
Author: Shaan Rout <shaan.rout.1@gmail.com>
Date:   Today

    first commit
```

- ### git remote add origin <url>

  Links local repo to GitHub repo

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git remote add origin https://github.com/shaan/project.git
```

- ### git push -u origin master

  Sends your code to GitHub

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git push -u origin master
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 4 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (5/5), 412 bytes | 412.00 KiB/s, done.
To https://github.com/shaan/project.git
 * [new branch]      master -> master
branch 'master' set up to track 'origin/master'.
```

- ### git pull origin master

  Brings latest changes from GitHub.

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git pull origin master
Already up to date.
```

- ### git clone <url>

  Copies a GitHub repo to your system.

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop
$ git clone https://github.com/shaan/another-repo.git
Cloning into 'another-repo'...
remote: Enumerating objects: 10, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (8/8), done.
Receiving objects: 100% (10/10), done.
```

- ### git branch

  Shows all branches in the repo.

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git branch
* master
```

- ### git checkout -b new-feature

  Creates and switches to a new branch.

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git checkout -b new-feature
Switched to a new branch 'new-feature'
```

- ### git merge new-feature

  Merges changes from another branch into current.

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git merge new-feature
Updating abc123..def456
Fast-forward
 file1.txt | 1 +
 1 file changed, 1 insertion(+)
```

## GitHub Workflow using Git

### Step 2: Link Local Git Repo to GitHub

- Use this command to connect your local Git folder to the online GitHub repo.

  git remote add origin <url>

- Output:

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git
$ git remote add origin https://github.com/shaan/project.git
```

## Step 3: Push Your Code to GitHub

- This command uploads your commits to GitHub.

  git push -u origin master

- Output:

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git push -u origin master
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 4 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (5/5), 412 bytes | 412.00 KiB/s, done.
To https://github.com/shaan/project.git
 * [new branch]      master -> master
branch 'master' set up to track 'origin/master'.
```

## Step 4: Pull Changes from GitHub

- This command brings down the latest changes from GitHub into your local project.

  git pull origin master

- Output:

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git pull origin master
Already up to date.
```

## Step 5: Clone an Existing GitHub Repo

- This will copy a repository from GitHub to your local system.

  git clone <existing-repo-url>

- Output:

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop
$ git clone https://github.com/shaan/another-repo.git
Cloning into 'another-repo'...
remote: Enumerating objects: 10, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (8/8), done.
Receiving objects: 100% (10/10), done.
```

## Step 6: Create and Switch to a New Branch

- To work on a feature without affecting main code, use:

  git checkout -b new-feature

- Output:

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git checkout -b new-feature
Switched to a new branch 'new-feature'
```

## Step 7: Merge the Branch Back to Main/Master

- Once feature work is done, merge it into main. Use:

  git checkout master

  git merge new-feature

Output:

```
shaan@LAPTOP-AIA01JG9 MINGW64 ~/OneDrive/Desktop/Git (master)
$ git merge new-feature
Updating abc123..def456
Fast-forward
 file1.txt | 1 +
 1 file changed, 1 insertion(+)
```