Git and GitHub Tutorial

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Introduction to Git

Git is a distributed version control system that helps developers manage and track changes to their code over time. It allows multiple developers to work on the same project simultaneously without interfering with each other's work.

GitHub is a cloud-based hosting service for Git repositories. It allows users to store and manage their Git repositories and collaborate on projects.

Git Basics Key Concepts:

Repository (Repo): A project folder that contains all your code and version history.

Commit: A snapshot of changes made to files. Commits are like save points in your project.

Branch: A parallel version of the repository, where developers can work on features independently.

Merge: Combining changes from different branches into a single branch.

Clone: A copy of a repository from GitHub to your local machine.

Using GitHub

Step 1: Create a GitHub Account

- Go to GitHub.com and sign up for a free account.

Step 2: Create a New Repository on GitHub

- Click on the New Repository button.

- Name the repository, set visibility, initialize with README if needed.

- Click Create Repository.

Step 3: Clone the Repository

- Click the green Code button and copy the HTTPS URL.

- Run: git clone <repository-url>

Step 4: Push Changes

- Edit/add/delete files.

- Use git add, git commit, and git push to update GitHub.

Git and GitHub Workflow

Basic Workflow:

- Clone the repository

- Create a new branch

- Make changes, stage, and commit

- Push and create a Pull Request

Pull Request:

- A PR proposes changes to a repository.

- Review and merge via 'Compare & pull request' button.

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Git Commands with Examples

git –version

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~
$ git --version
git version 2.45.2.windows.1
```

Description: Shows the installed Git version on your system.

git init

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git init
Initialized empty Git repository in C:/Users/MIHIR KUMAR/git/assignment2/.git/
```

Description: Initializes a new Git repository in the current directory.

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

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git config --global user.name "Mihir Kumar"
```

Description: Sets your Git username globally for all repositories.

git config --global user.email "youremail@example.com"

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git config --global user.email "mihirawesome09@gmail.com"
```

Description: Sets your Git email globally for all repositories.

ls -a

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ ls -a
./  ../  .git/  file.txt
```

Description: Lists all files in the directory including hidden ones (those starting with `.`).

git add file.txt

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git add file.txt
warning: in the working copy of 'git/assignment2/file.txt', LF will be replaced by CRLF the next time Git touches it
```

Description: Adds `file.txt` to the staging area, marking it for the next commit.

git status

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```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        file.txt

nothing added to commit but untracked files present (use "git add" to track)
```

Description: Displays the state of the working directory and staging area.

git commit -m "file updated"

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git commit -m "file updated"
[master (root-commit) f64cd82] file updated
 1 file changed, 1 insertion(+)
 create mode 100644 git/assignment2/file.txt
```

Description: Commits the staged changes with a commit message.

git checkout -f

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git checkout -f
```

Description: Forces checkout to the last committed state, discarding uncommitted changes.

git mv text.txt text1.txt

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git mv file.txt file1.txt
```

Description: Renames or moves `text.txt` to `text1.txt` and stages the change.

git ls-files

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ git ls-files
```

Description: Lists all the files tracked by Git in the repository.

git log

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (assignment2)
$ git log
commit f64cd826dbcb5f651d1fae879a2ede5d3dced5de (HEAD -> assignment2, master)
Author: Mihir Kumar <mihirawesome09@gmail.com>
Date:   Wed Apr 9 17:13:42 2025 +0530

    file updated
```

Description: Shows the commit history (logs) for the repository.

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git branch

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (assignment2)
$ git branch
HEAD          assignment2   master
```

Description: Lists all branches in the repository and highlights the current branch.

git branch branch-name

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (master)
$ git branch assignment2
```

Description: Creates a new branch named `branch-name`.

git checkout branch-name

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (master)
$ git checkout assignment2
Switched to branch 'assignment2'
```

Description: Switches to the branch named `branch-name`.

git merge branch-name

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (master)
$ git merge assignment2
```

Description: Merges the branch `branch-name` into the current branch.

git branch -d branch-name

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (master)
$ git branch -d assignment2
```

Description: Deletes the branch `branch-name`.

git clone <repository-url>

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (master)
$ git clone https://github.com/mihir841/Wipro.git
Cloning into 'Wipro'...
remote: Enumerating objects: 13, done.
remote: Counting objects: 100% (13/13), done.
remote: Compressing objects: 100% (7/7), done.
remote: Total 13 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (13/13), done.
```

Description: Clones the remote repository to your local machine.

git rm hello.txt

```
MIHIR KUMAR@LAPTOP-8L9A0TAA MINGW64 ~/git/assignment2 (master)
$ git rm file.txt
```

Description: Removes `hello.txt` from the working directory and stages the deletion.

touch hello.txt

```
MIHIR KUMAR@LAPTOP-8L9AOTAA MINGW64 ~/git/assignment2 (master)
$ touch file.txt
```

Description: Creates a new, empty file named `hello.txt` in the current directory.