1. Git Basics

- **Initialize a Git repository**

```
git init
```

2. Git Add

- **Stage files for commit**

```
git add <file_name>          # Adds a specific file
git add .                    # Stages all changed files in the current directory
```

3. Git Commit

- **Commit staged changes**

```
git commit -m "Commit message"    # Commits with a message
git commit -am "Commit message"   # Adds and commits in one step for tracked files
```

4. Git Push

- **Push changes to a remote repository**

```
git push origin <branch_name>     # Pushes your changes to the remote branch
git push -u origin <branch_name>  # Sets the default remote and branch for future pushes
```

5. Git Pull

- **Fetch and integrate changes from a remote repository**

```
git pull origin <branch_name>    # Pulls changes from the remote branch
```

6. Creating User Profile

- **Set global Git user name and email**

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

- **Unset global Git user and email**

```
git config --global --unset user.name
git config --global --unset user.email
```

7. Pull Remote Repo to Local

- **Clone a repository**

```
git clone <repository_url>      # Clones the remote repository to your local machine
```

- **Update your local repository with changes from remote**

```
git pull                    # Fetch and merge changes from the remote repository
```

8. Version Control System in Git and GitHub

Git provides version control through commits and branches:

- **Check the current status of the repository**

```
git status
```

- **View commit history**

```
git log
```

- **Switch between branches**

```
git checkout <branch_name>
```

- **Create a new branch**

```
git branch <branch_name>
```

9. Git Merge

- **Merge changes from one branch into another**

```
git merge <branch_name>        # Merges the specified branch into your current branch
```

10. Git Fork

- **Forking a repository is done on GitHub**. Once you've forked a repository, you can clone it:

```
git clone <forked_repo_url>    # Clones your forked repo from GitHub to your local machine
```

11. Git Delete Commands

- **Delete a branch (local)**

```
git branch -d <branch_name>     # Deletes the branch locally (only if merged)
git branch -D <branch_name>     # Force deletes the branch (even if not merged)
```

- **Delete a branch (remote)**

```
git push origin --delete <branch_name>    # Deletes the branch on the remote repository
```

- **Delete a file**

```
git rm <file_name>             # Removes the file from the working directory and stages the change
```

- **Remove untracked files**

```
git clean -f                # Deletes untracked files from the working directory
git clean -fd               # Deletes untracked files and directories
```

12. Git Reset & Revert

- **Undo the last commit (keep changes)**

```
git reset --soft HEAD^
```

- **Undo the last commit (remove changes)**

```
git reset --hard HEAD^
```

- **Revert a specific commit**

git revert <commit_hash> # Creates a new commit that undoes the changes from the specified commit

13. Unset Commands and Clean-Up

- **Unset global configuration**

git config --global --unset <config_name>

- **Delete local git repository (remove .git directory)**

rm -rf .git # Deletes the Git repository from the current directory

- **Clear Git log files**

git reflog expire --expire=now --all

git gc --prune=now

This list covers most of the commonly used Git and GitHub commands for adding, committing, pushing, pulling, merging, and deleting. Let me know if you need more details on any of these topics!

How to merge

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)

$ git status

On branch master

Changes to be committed:

(use "git restore --staged <file>..." to unstage)

new file: index.txt

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)

$ git commit -m "New branch and index.txt file addition."

[master bdd9cab] New branch and index.txt file addition.

1 file changed, 1 insertion(+)

create mode 100644 index.txt

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)

$ git push origin master

Enumerating objects: 4, done.

Counting objects: 100% (4/4), done.

Delta compression using up to 20 threads

Compressing objects: 100% (2/2), done.

Writing objects: 100% (3/3), 379 bytes | 379.00 KiB/s, done.

Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)

remote:

remote: Create a pull request for 'master' on GitHub by visiting:

remote: https://github.com/Alpha0705/testGit/pull/new/master

remote:

To https://github.com/Alpha0705/testGit.git

 * [new branch] master -> master

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)

$ git checkout main

Switched to branch 'main'

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)

$ git merge master

Updating 3b5460e..bdd9cab

Fast-forward

 index.txt | 1 +

 1 file changed, 1 insertion(+)

 create mode 100644 index.txt

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)

$ git status

On branch main

nothing to commit, working tree clean

Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)

$ git add .

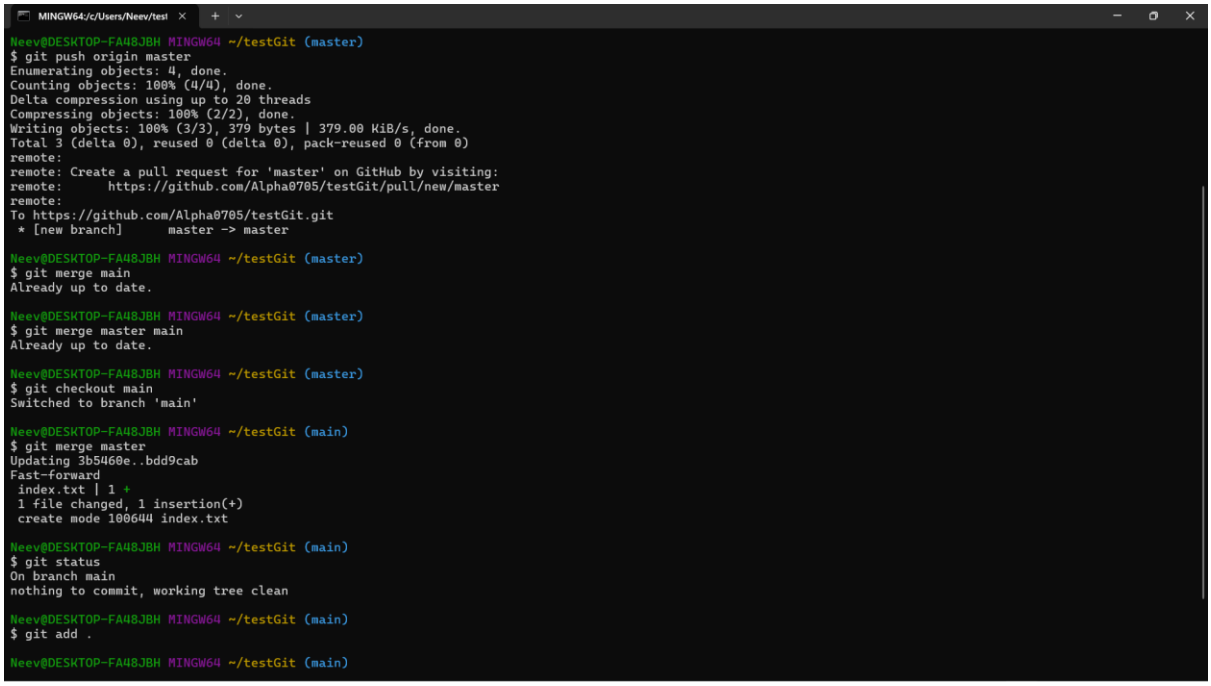
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)

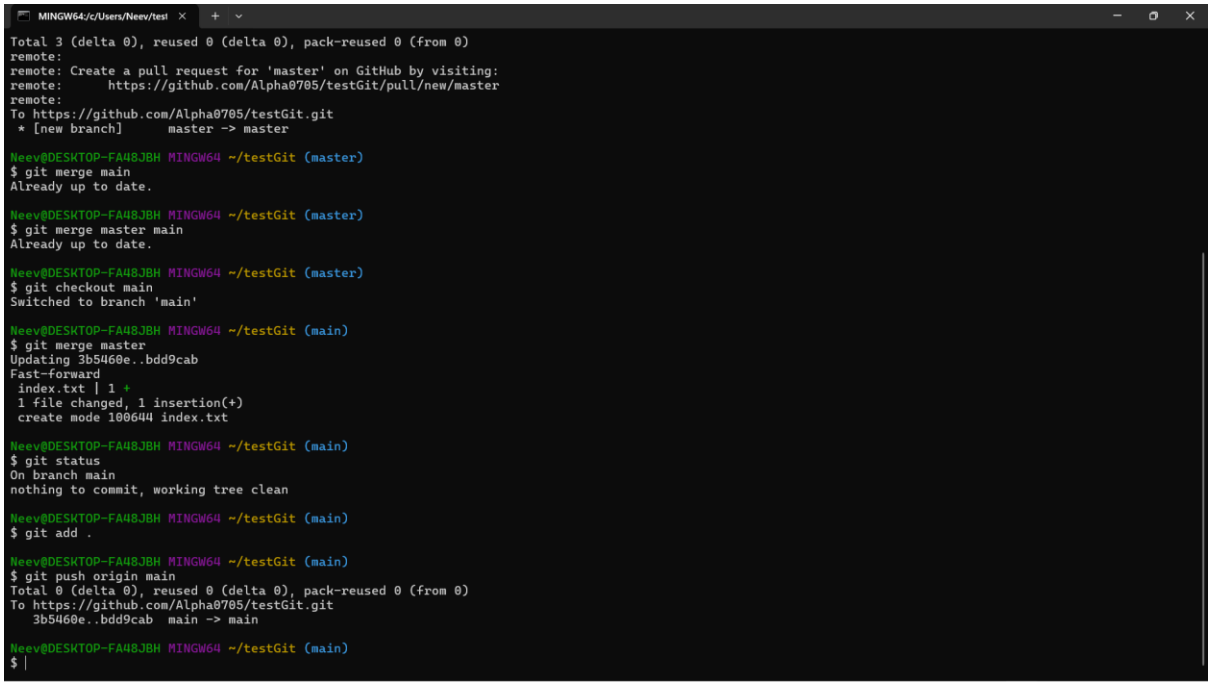
$ git push origin main

Total 0 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)

To https://github.com/Alpha0705/testGit.git

  3b5460e..bdd9cab main -> main


MINGW64:/c/Users/Neev/test
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git push origin master
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 20 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 379 bytes | 379.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
remote:
remote: Create a pull request for 'master' on GitHub by visiting:
remote: https://github.com/Alpha0705/testGit/pull/new/master
remote:
To https://github.com/Alpha0705/testGit.git
* [new branch] master -> master
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git merge main
Already up to date.
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git merge master main
Already up to date.
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git checkout main
Switched to branch 'main'
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git merge master
Updating 3b5460e..bdd9cab
Fast-forward
index.txt | 1 +
1 file changed, 1 insertion(+)
create mode 100644 index.txt
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git status
On branch main
nothing to commit, working tree clean
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git add .
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)


MINGW64:/c/Users/Neev/test
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
remote:
remote: Create a pull request for 'master' on GitHub by visiting:
remote: https://github.com/Alpha0705/testGit/pull/new/master
remote:
To https://github.com/Alpha0705/testGit.git
* [new branch] master -> master
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git merge main
Already up to date.
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git merge master main
Already up to date.
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (master)
$ git checkout main
Switched to branch 'main'
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git merge master
Updating 3b5460e..bdd9cab
Fast-forward
index.txt | 1 +
1 file changed, 1 insertion(+)
create mode 100644 index.txt
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git status
On branch main
nothing to commit, working tree clean
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git add .
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$ git push origin main
Total 0 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/Alpha0705/testGit.git
3b5460e..bdd9cab main -> main
Neev@DESKTOP-FA48JBH MINGW64 ~/testGit (main)
$

Theory

Git and GitHub Commands Overview

1. Version Control System (VCS)

A **Version Control System (VCS)** is a system that tracks changes in source code or other collections of files, allowing multiple users to collaborate, view history, and revert changes. Git is a **Distributed Version Control System (DVCS)**, meaning every user has a full copy of the repository history, making collaboration flexible and efficient.

2. Git Initialization

- **Command:** git init

- **Purpose:** Initializes a new Git repository in the current directory, creating a .git directory to store repository history and metadata.

- **Usage:** Run this command inside any folder to begin version control.

```
git init
```

3. Staging and Adding Files

- **Command:** git add <file_name> or git add .

- **Purpose:** Moves files from the working directory to the staging area (also called the index), preparing them for the next commit. You can stage specific files or all changes in the directory.

- **Usage:**

```
git add myfile.txt       # Add specific file
git add .                # Add all changes in the directory
```

4. Committing Changes

- **Command:** git commit -m "Commit message"

- **Purpose:** Records the changes staged in the repository's history by creating a new commit. Each commit represents a snapshot of the project at a given time.

- **Usage:**

```
git commit -m "Initial commit"
```

- **Flags:**

- -m: Allows you to add a commit message directly.

5. Pushing to a Remote Repository

- **Command:** git push origin <branch_name>

- **Purpose:** Sends committed changes from the local repository to a remote repository on platforms like GitHub. You need to specify the remote (origin) and the branch to push to (e.g., main, master).

- **Usage:**

git push origin main

6. Pulling Changes from a Remote Repository

- **Command:** git pull origin <branch_name>

- **Purpose:** Fetches changes from the remote repository and integrates them into the current branch. This command combines git fetch (downloading changes) and git merge (applying changes).

- **Usage:**

git pull origin main

7. Branching

- **Command:** git branch <branch_name>

- **Purpose:** Creates a new branch. Branches allow developers to work on different features or fixes simultaneously without affecting the main or master branch.

- **Usage:**

git branch feature-branch

8. Switching Branches

- **Command:** git checkout <branch_name>

- **Purpose:** Switches to the specified branch in the repository. It updates the working directory to reflect the state of the selected branch.

- **Usage:**

```
git checkout main
```

9. Merging Branches

- **Command:** git merge <branch_name>

- **Purpose:** Combines changes from the specified branch into the current branch. For example, merging master into main incorporates the changes from master into main.

- **Usage:**

```
git merge master
```

10. Cloning a Repository

- **Command:** git clone <repository_url>

- **Purpose:** Creates a local copy of a remote Git repository, allowing you to contribute to the project. Cloning brings down the entire project history.

- **Usage:**

```
git clone https://github.com/user/repository.git
```

11. Forking a Repository (on GitHub)

- **Forking** is not a command you run locally but an action you perform on GitHub. When you fork a repository, it creates a copy of the repository under your GitHub account, allowing you to contribute to it independently.

- **Purpose:** Forking allows you to make changes and later request them to be merged back via a **pull request**.

12. Git Status

- **Command:** git status

- **Purpose:** Shows the status of the working directory and staging area. It lists the files that are staged for the next commit, files with changes not staged, and untracked files.

- **Usage:**

git status

13. Git Log

- **Command:** git log

- **Purpose:** Displays the commit history for the current branch, showing commit messages, authors, and timestamps. Useful for understanding the history of changes.

- **Usage:**

git log

14. Undoing Changes

- **Command:** git reset --soft, git reset --hard, git revert

- **Purpose:** These commands allow you to undo changes:

- git reset --soft: Reverts the last commit, but keeps the changes in the staging area.

- git reset --hard: Reverts the last commit and discards all changes.

- git revert <commit_hash>: Creates a new commit that undoes the changes of the specified commit.

- **Usage:**

git reset --soft HEAD^

git reset --hard HEAD^

git revert <commit_hash>

15. Removing Files

- **Command:** git rm <file_name>

- **Purpose:** Removes a file from both the working directory and the staging area. When committed, the file is deleted from the repository.

- **Usage:**

git rm myfile.txt

16. Unstaging Files

- **Command:** git reset <file_name>

- **Purpose:** Removes a file from the staging area but leaves the file in the working directory.

- **Usage:**

git reset myfile.txt

17. Deleting Branches

- **Command:** git branch -d <branch_name> or git branch -D <branch_name>

- **Purpose:** Deletes a branch from the local repository.

- -d: Deletes the branch only if it has been fully merged.

- -D: Force deletes the branch, even if it hasn't been merged.

- **Usage:**

git branch -d feature-branch

git branch -D feature-branch

18. Setting Global Username and Email

- **Command:** git config --global user.name and git config --global user.email

- **Purpose:** Sets your name and email globally in Git, which is attached to every commit you make.

- **Usage:**

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

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

- **Unset global username and email**

git config --global --unset user.name

git config --global --unset user.email

19. Git Clean

- **Command:** git clean -f or git clean -fd

- **Purpose:** Removes untracked files and directories from the working directory.

- -f: Force clean.

- -d: Also clean untracked directories.

- **Usage:**

git clean -f

git clean -fd

20. Removing Global Configurations

- **Command:** git config --global --unset

- **Purpose:** Removes global configurations like username or email.

- **Usage:**

git config --global --unset user.name

git config --global --unset user.email

Version Control System in Git and GitHub

Git uses a **Distributed Version Control System (DVCS)**. Each contributor has a full copy of the project's history and can commit changes offline. It enables version tracking, collaboration, and multiple users working on the same project. GitHub is a cloud-based Git repository hosting service, adding features like pull requests, issue tracking, and project management.

Main Features of Version Control with Git and GitHub:

1. **Branching and Merging**: Multiple users can work on the same project simultaneously by creating branches. Once the work is done, changes can be merged back into the main branch.

2. **Commits**: Each snapshot of the project history is a **commit** with a unique ID, allowing you to revert to any point in the project's history.

3. **Collaboration**: GitHub enables collaboration by allowing multiple users to contribute, fork, and open pull requests to suggest changes.

4. **History and Rollback**: Git tracks every change, allowing you to see who made which changes and revert any mistakes.

Git and GitHub provide powerful tools for managing codebases, tracking changes, and collaborating effectively across teams.