What is git?
Git is a distributed version control system used to track changes in source code and collaborate with multiple developers efficiently.

What is version control?
Version control is a system that records changes to files over time, allowing you to:
- Revert to previous versions.
- Track who made changes.
- Work safely in team.

Difference between Git and GitHub?

Git	GitHub
Tool/software	cloud platform
Runs locally	Runs online
Tracks code changes	stores & shares git repositories

What is a Repository?
A repository (repo) is a project folder managed by Git, containing source code and Git history.

Basic Git commands:

git init
Meaning: Start Git in a folder
Use: Creates a new Git repository.
Command: git init

git clone
Meaning: Copy a project from the internet
Use: Downloads an existing repository.
Command: git clone <repo-url>

git status
Meaning: check project status
Use: Shows changed, staged and untracked files
Command: git status

git add:
Meaning: Tells Git which files to save.
Use: Moves file to the staging area.

Command:
  git add file.txt
  git add .

git commit
Meaning: Save changes permanently
Use: Creates a snapshot with a message.
Command: git commit -m "message"

git log
Meaning: View past commits
Use: shows commit history.
Command:
  git log
  git log --oneline

git diff
Meaning: See what was changed.
Use: Shows differences in files
Command:
  git diff
  git diff --staged

Branch Commands (working on versions):

git branch
Meaning: Work on different versions
Use: Create or view branches
Command:
  git branch
  git branch new-branch

git checkout
Meaning: Move to another branch
Use: Switch branches
Command:
  git checkout branch-name

git merge
Meaning: Combine branches
Use: Merge one branch into another
Command: git merge branch-name

Remote Repository commands:

git remote
Meaning: Connect project to GitHub
Use: View or add remote repositories.
Command:

```
git remote -v
git remote add origin <url>
```

git push
Meaning: Upload work to GitHub
Use: Send commits to remote repository.
Command: git push origin main

git pull
Meaning: Download updates from GitHub
Use: Fetch + merge changes.
Command: git pull origin main

git fetch
Meaning: Check updates without merging
Use: Downloads changes only
Command: git fetch

Undo commands:

git reset
Meaning: Remove changes before commit
Use: Unstage files
Command: git reset file.txt

git revert
Meaning: Undo a commit safely
Use: Create a new commit that reverses changes

Command: git revert commit-id.

git stash

Meaning: Hide changes temporarily

Use: Save work without committing

Command:

```
git stach
git stach pop
```

Other important terms:

- gitignore

Meaning: Files Git should NOT track

Excamples:

- node_modules/
- passwards
- temp files

git help

Meaning: Get help for any command

Command:

```
git help
git help commit
```

what is origin in Git?

origin is the default name of the remote repository (usually on GitHub) that your local Git project is connected to

Why is origin used?

- To shorten remote URLs
- To easily push or pull code.
- To identify where the code should be sent or fetched from.

what is Merge Conflicts?

A merge conflict occurs when Git cannot automatically merge changes because the same part of the file was edited differently in two branches.

When do merge conflicts occur?

- Same line modified in two branches.

- One branch deleted a file, another modifies it.
- Changes overlap in the same file.

How to resolve a merge conflict?

Steps:

1. Open the conflicted file.
2. Decide which changes to keep
3. Remove conflict markers.
4. Save the file
5. Add a commit

How to avoid merge conflicts?

- Pull latest code before starting work.
- Work on small commits.
- Communication with team.
- Use feature branches.

Something more on Git:

git rebase

Rebase moves your commits on top of another branch, creating a clean, linear history.

Command:

git rebase main

Use case: Used to update a feature branch with the latest main branch changes.

Merge vs Rebase

Merge	Rebase
Create a merge commit	No merge commit
History is branched	History is linear
Safe for shared branches	Not safe on shared branches

git cherry-pick

cherry-pick applies a specific commit from one branch to another

command: git cherry-pick commit-id

use case: Apply a bug fix without merging the entire branch.

Head

Head is a pointer that represents the current branch or commit you are working on.

Detached Head

Detached HEAD occurs when you checkout a commit instead of a branch.

command: git checkout commit-id

Risk: Changes may be lost if not saved to a branch.

Fix: git checkout -b new-branch

git rm

Removes a file and records the deletion in Git

Command: git rm file.txt

Difference:

- git rm → deletes + stages
- manual delete → needs git add

git mv

Moves or renames a file and tracks it in Git.

command: git mv old.txt new.txt

git tag

Tags mark important points like releases or versions

Command: git tag v1.0

Fork vs clone

Fork	clone
Creates repo copy on gitHub	Creates local copy
Used in open source	used in development
Independent repository	Linked to original

When to use fork?
- Contributing to open-source projects
- No direct write access.

More on Branches:

Delete a local branch

Deletes a branch from your local repository

Safe delete:

```
git branch -d branch-name
```

- Deletes the branch only if it is already merged.
- Prevents accidental data loss.

Force delete:

```
git branch -D branch-name
```

- Deletes branch even if not merged.

Delete a remote branch

Deletes a branch from the remote repository (GitHub)

command: gid push origin --delete branch-name

List Branches

List local branches

```
git branch
```

List remote branches

```
git branch -r
```

List all branches

```
git branch -a
```

Rename a branch

Rename current branch

```
git branch -m new-name
```

Rename another branch

```
git branch -m old-name new-name
```

Switch branch

git switch branch-name

create and switch

git switch -c new-branch

* modern alternative to git checkout.

Some more commands:

git log --oneline

shows the commit history in a short, single-line format

git diff -staged

shows changes that are staged (added using git add) but not yet committed

git remote -V

. shows remote repository names and their URLS

. To verify where code is being pushed / pulled from.

git remote add origin <repo-url>

connects your local repository to a remote repository.

It is used after git init (when repo was not cloned)

git remote set-url origin <new-url>

changes the existing remote repository URL

It is used when:

- Repo URL changed
- Switching github accounts.
- Changing HTTP ↔ SSH.

git remote remove origin

Removes the connection to the remote repository.

Does not delete the gitHub repo, only removes local link.