Git & GitHub Notes

Version Control System (VCS)

- A Version Control System tracks changes in code over time.
- It helps developers collaborate, manage code, and track history.
- Git is a popular, free, and open-source version control system.
- Developed by Linus Torvalds in 2005.
- Fast, scalable, and supports distributed development.

GitHub

- GitHub is a website that allows developers to store and manage their code using Git.
- It provides cloud-based repositories for collaboration.
- Terms:
- Folder → Repository
- Changes → Commit

Setting Up Git

- Requirements:
- Visual Studio Code (Editor)
- Git Bash (Windows) or Terminal (Mac)
- Verify installation:

git --version

Configuring Git

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

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

git config --list   # View all configurations
```

Git Workflow

- Clone the repo (copy from GitHub to local):

git clone <repository-link>

cd – Change Directory
Clear – to clear Terminal
ls – to list Files
ls -a – to see hidden files

- Add changes:

git add <file-name> # Add specific file
git add . # Add all files

- Check status:

git status

- Commit changes:

git commit -m "Commit message"

- Push to remote repository:

git push origin main

- Git is Divided into 4 states

1. Untracked
2. Modified
3. Stated (Ready to Commit)
4. Unmodified

- Cd .. – To get out of Current Directory

- Git push -u orgin main – to declare further work to be committed to the main branch so after we simply need to enter " git push "

- Git init – initialize an existing directory as a Git repository

Creating & Managing Branches

```
git branch                  # List branches

git branch -M main          # Rename to main

git checkout -b feature1    # Create & switch to new branch

git checkout main           # Switch to main branch

git branch -d feature1      # Delete branch
```

Remote Setup

```
git remote add origin <link>

git remote                  # View remotes
```

```
git remote -v               # to verify remote
```

Pulling & Merging

- Pull (download latest changes):

git pull origin main

- Merge branches:

git merge <branch-name>

- View difference:

git diff <branch-name>

- Create a Pull Request:

Use GitHub GUI → For code review & approval.

Undoing Changes

- Case 1: Unstaged changes

git reset <file-name>

- Case 2: Undo last commit

git reset HEAD~1

- Case 3: Reset to specific commit

git reset <commit-hash>

git reset –hard <commit-hash> to make the changes in local system

- Check commit history:

git log

Merge Conflicts

- Occur when same lines are changed in multiple branches.
- Manually resolve conflicts in files.
- Then:
- git add . – add all files
- git commit -m "Resolved conflict"

Fork

- A fork is your personal copy of someone else's repository.
- It lets you experiment without affecting the original project.