

# Git & GitHub Complete Roadmap (Basic to Advanced)

## ■ 1. Introduction to Git & GitHub

- What is Version Control System (VCS)?
- Centralized vs Distributed VCS
- What is Git? What is GitHub?
- Git vs GitHub vs GitLab vs Bitbucket
- Installing Git
- Git configuration
- git config --global user.name 'Your Name'
- git config --global user.email 'you@example.com'

## ■ 2. Git Basics

- Initialize repository: git init
- Check repo status: git status
- Track files: git add filename | git add .
- Commit changes: git commit -m 'Message'
- View history: git log | git show
- View changes: git diff | git diff --staged

## ■ 3. File Management in Git

- Rename files: git mv old new
- Remove files: git rm filename
- Unstage changes: git restore --staged filename
- Discard changes: git restore filename
- Amend last commit: git commit --amend

## ■ 4. Branching and Merging

- What is a branch and why use it?
- Create: git branch feature-x
- Switch: git checkout feature-x | git switch feature-x
- Create+Switch: git checkout -b feature-x
- Merge: git merge feature-x
- Delete: git branch -d feature-x
- View: git branch | git branch -a

## ■ 5. Merge Conflicts

- When and why conflicts happen
- git status to locate conflicts
- Manual conflict resolution
- Abort: git merge --abort
- Use VS Code / merge tools

## ■ 6. Working with Remote Repositories

- git remote add origin
- git push -u origin main
- git pull origin main
- git fetch vs git pull
- View remotes: git remote -v
- Remove: git remote remove origin

## ■ 7. GitHub Fundamentals

- Creating account & repo
- Creating/Cloning repos
- Uploading code
- Adding SSH keys
- README.md and LICENSE
- GitHub UI overview

## ■ 8. Collaboration with GitHub

- Forking a repository
- Pull Request (PR) process
- Assign reviewers & labels
- GitHub Issues & Discussions
- Project Boards & Milestones
- Notifications & Watch/Star
- 9. Git Tools and Logs
- git log | git log --oneline --graph
- git blame filename
- git show
- git diff
- git revert
- git reset (soft, mixed, hard)
- 10. Stashing
- Save: git stash | git stash save 'msg'
- List: git stash list
- Apply: git stash apply
- Drop: git stash drop
- 11. Tags in Git
- Create: git tag v1.0 | git tag -a v1.0 -m 'Version 1.0'
- List: git tag
- Push: git push origin v1.0 | git push origin --tags
- 12. Rebasing & Cherry-Picking
- git rebase main
- Interactive: git rebase -i HEAD~n
- Cherry-pick: git cherry-pick
- 13. .gitignore & Cleanups
- Create .gitignore
- Global .gitignore: ~/.gitignore\_global
- Remove untracked: git clean -f | git clean -fd
- 14. GitHub Advanced
- GitHub Actions (CI/CD)
- GitHub Pages
- Security with PAT
- Secrets & Env Variables
- Repository Insights
- 15. Open Source Contributions
- Find good-first issues
- Fork > Clone > Branch > PR workflow
- Sync fork:
- git remote add upstream
- git fetch upstream
- git checkout main
- git merge upstream/main
- git push origin main
- 16. Git Advanced Topics
- Git Hooks
- Git LFS
- Submodules
- Git Bisect
- 17. GUIs & Tools
- GitHub Desktop
- Sourcetree
- GitKraken
- VSCode Git Integration
- Git CLI enhancements (tig, lazygit)
- Real-Time Project Ideas

- Create & maintain portfolio site
- Mini blog + GitHub Pages
- Contribute to open source
- Team project with PRs

■ Resources

- Git Docs, GitHub Docs
- Try Git Interactive
- Learn Git Branching
- Pro Git Book