

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