

# Mastering Git & GitHub: From Zero to Collaboration

## A Comprehensive Hands-on Course

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# Course Overview

- Understand version control concepts
- Master Git commands and workflows
- Collaborate effectively using GitHub
- Handle real-world scenarios
- Learn best practices and troubleshooting

# Course Structure

- 1 Session 1: Version Control & Git Fundamentals
- 2 Session 2: Collaboration on GitHub
- 3 Session 3: Common Git Problems
- 4 Conclusion

# Learning Objectives

By the end of this session, you will be able to:

- Explain the importance of version control
- Set up and configure Git
- Create and manage repositories
- Track changes with commits



# Why Version Control?

## Scenario: The "One Small Change" Problem

- Your program is working perfectly.
- You change "just one little thing" ...
- Your program breaks.
- You try to change it back...
- **Your program is still broken!**

# What is Version Control?

A system that records changes to files over time

Think of it as a **time machine** for your code!

## Key Features

- **History:** See who changed what and when.
- **Backup:** Recover any previous version.
- **Collaboration:** Work with others seamlessly.

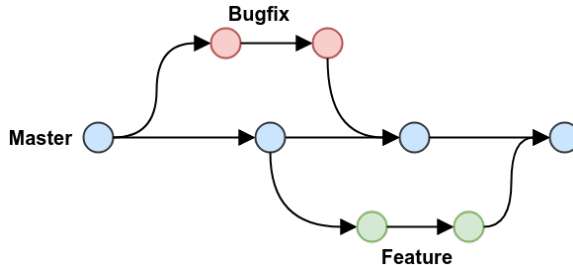
## Analogy

Like "Track Changes" in a document, but supercharged for code.

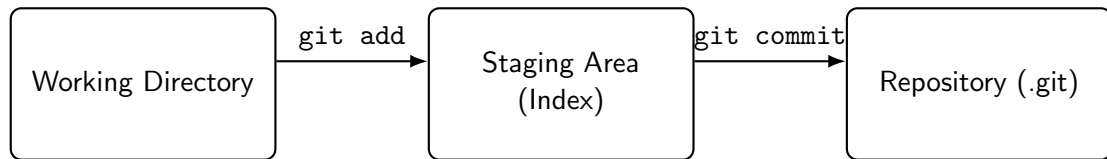
# What is Git?

## A distributed version control system

- Created by Linus Torvalds in 2005
- Initially developed for Linux kernel development
- Now the most widely used VCS in the world



# Core Git Concepts: The Three Areas



- **Working Directory:** Files you actively modify.
- **Staging Area:** Draft of your next commit.
- **Repository:** Full history stored in .git.



# Essential Git Commands

## Basic Commands

`git init` Initialize a new repository  
`git add` Stage changes for commit  
`git commit` Save changes to the repository  
`git log` View the commit history  
`git status` Check the status of your files

## Useful Options

`git status -s` Compact status view  
`git log --oneline` Compact log view  
`git commit -am` Add & commit in one step

# Working with Branches

## Scenario 2: The "Works on My Machine" Problem

- You want to add something new to your project,
- but you're afraid this small change might break everything,
- and you don't want to mess up the version that's already working well.
- **Branches to the rescue!**

# Working with Branches

## What are Branches?

Branches are independent lines of development. They let you work on features or fixes without affecting main.

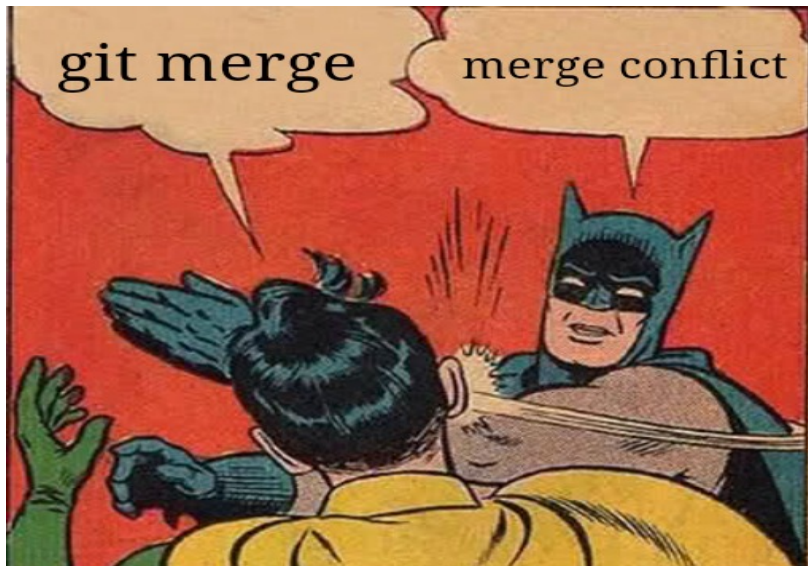
## Branch Commands

```
git branch List all branches
git switch -c <name> Create a new
                    branch
git switch <name> Switch branches
git merge <name> Merge a branch
```

## Branching Strategy

- **main**: Production code
- **develop**: Integration branch
- **feature/\***: New features
- **hotfix/\***: Urgent fixes

# Merge Conflicts



# How to Resolve Merge Conflicts

## What is a Merge Conflict?

Happens when Git cannot automatically merge because two branches edit the **same line** or one deletes a file the other modified.

## Step-by-Step Resolution

- 1 Open the conflicted file(s)
- 2 Look for conflict markers:
  - ▶ <<<<<< HEAD (your changes)
  - ▶ =====
  - ▶ >>>>>> branch-name (their changes)
- 3 Edit code to keep desired changes & remove markers
- 4 Save the file
- 5 Stage the resolved file: `git add <file>`

## Example in a File

```
1  /* style.css */
2  .title {
3  <<<<<< HEAD
4      color: blue;
5  =====
6      color: red;
7  >>>>>> feature-new-color
8  }
```

# Key Takeaways

## What We've Learned

- Version control is essential for tracking changes
- Git provides a powerful way to manage project history
- Basic workflow: modify → stage → commit

# End of Session 1

Next: Session 2 — Collaboration on GitHub

# Session 2 Begins

Collaboration on GitHub



## Session 2: What You'll Learn

### GitHub Basics

- Creating repositories
- Pushing code
- Basic collaboration

[Space for GitHub screenshot]

# Introduction to GitHub

## What is GitHub?

- A cloud platform for hosting Git repositories
- A hub for developer collaboration
- The world's largest open-source community
- A professional portfolio for your work

## Key Features

- Code hosting & version control
- Issue tracking
- Pull Requests
- GitHub Actions (CI/CD)
- GitHub Pages

# The Git + GitHub Workflow

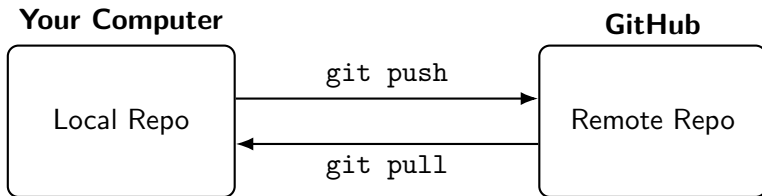
## Essential Remote Commands

`git clone <url>` Download a repo from GitHub

`git push` Upload committed changes

`git pull` Download & merge changes

`git remote add origin <url>` Connect local repo to GitHub



## Golden Rule

Always `git pull` before `git push` to avoid unnecessary conflicts!

# Code Reviews

## Reviewing Code: What to Look For

- Bugs and edge cases
- Adherence to code style
- Opportunities for improvement
- Presence of tests
- Clear documentation

## Giving Good Feedback

- Be constructive and kind
- Explain the 'why' behind suggestions
- Ask questions instead of making demands
- Offer help if needed

# Pull Requests (PRs)

## What is a Pull Request?

A way to propose and discuss changes before merging them into the main project. PRs are the heart of collaboration on GitHub.

## The PR Workflow

- 1 Push your feature branch to GitHub
- 2 Click "New Pull Request" on GitHub
- 3 Describe your changes clearly
- 4 Request reviews from teammates
- 5 Discuss, make more changes if needed
- 6 Merge!

# End of Session 2

Next: Session 3 — Common Git Problems

# Session 3 Begins

Common Git Problems

# Common Git Problems & Fixes

## "I committed to the wrong branch!"

- **Scenario:** Accidentally committed on 'main' instead of your feature branch
- **Fix:**
  - ① Create the correct branch: `git branch feature-branch`
  - ② Reset main back one commit: `git reset HEAD~ --hard`
  - ③ Switch to your branch: `git checkout feature-branch`
  - ④ Commit is now safely on the correct branch

## "I need to undo my last commit!"

- Keep changes but undo commit: `git reset HEAD~`
- Permanently delete last commit: `git reset HEAD~ --hard` (caution!)



# Conclusion & Next Steps

## What You've Learned

- Git fundamentals & version control
- Using branches for parallel development
- Collaborating on GitHub via Pull Requests
- Handling merge conflicts & common issues

## Your Journey Forward

- Practice Git commands daily
- Start a personal project on GitHub
- Contribute to open-source projects

# Thank You!

Questions or feedback?