



Git and GitHub
Overview

Dr. Auqib Hamid
Lone

INTRODUCTION TO GIT AND GITHUB

Dr. Auqib Hamid Lone
(Asst. Professor CSE)

GOVERNMENT COLLEGE OF ENGINEERING AND TECHNOLOGY
SAFAPORA GANDERBAL

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What to Expect from This Session



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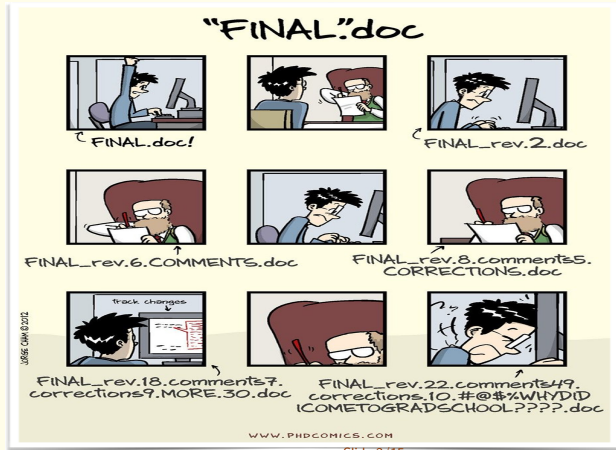
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After this session, you should be able to:

- Understand the fundamental concepts of Git and GitHub.
- Set up and initialize a Git repository.
- Track changes, stage, and commit files to a repository.
- Collaborate with others on GitHub using branching and pull requests.
- Use essential Git commands like add, commit, push, pull, and more.
- Apply branching and merging to manage different lines of development.

Without Git: The Struggle of Version Control

- Manually managing file versions can quickly become overwhelming and error-prone.
- Collaboration becomes challenging, as it's hard to keep track of the latest version.



What is Git?



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- A **distributed version control system** for tracking file changes.
- Created by Linus Torvalds in 2005 for Linux development.
- Decentralized: each contributor has a complete history of changes.
- “Git is a free and open source distributed version control system, which is fast and efficient.” - Git Homepage

Why Use Git?



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- **Version Control:** Keeps track of changes, enabling version history and easy restoration.
- **Collaboration:** Multiple contributors can work on a project without conflicts.
- **Reproducibility and Traceability:** Essential for reliable software development.

What is GitHub?



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- GitHub is a platform for hosting Git repositories with collaboration tools.
- Provides code review, project management, and issue tracking.
- Connects developers and supports open-source communities.

Git Working-I



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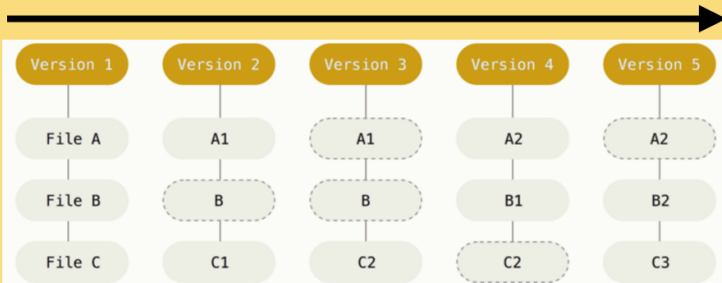


Figure 5. Storing data as snapshots of the project over time.

<https://git-scm.com/book/en/v2/Getting-Started-Git-Basics>

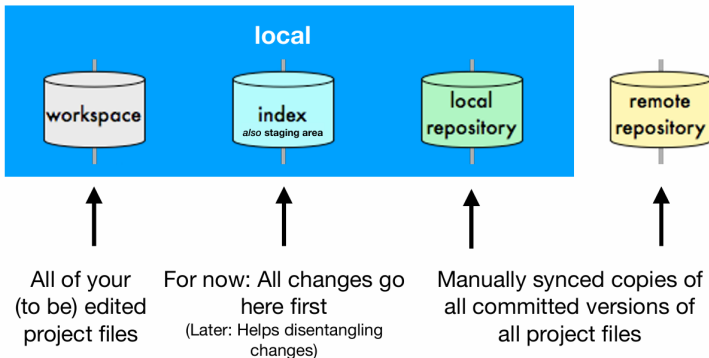
Git Working-II



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4 distinct places



Git Workflow-I

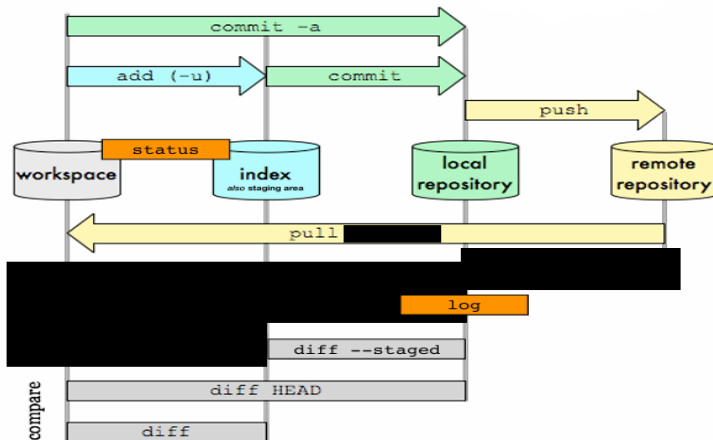


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Git Data Transport Commands

<http://osteele.com>



Git Workflow-II



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- `git init` - Initialize a repository
- `git add` - Stage changes for commit
- `git commit` - Commit changes with a message
- `git push` - Upload commits to remote repository

Essential Git Commands



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- `git init` - Start a new repo
- `git add` - Stage changes
- `git commit` - Save changes
- `git status` - Check repo status
- `git log` - View commit history
- `git branch` - Manage branches
- `git checkout` - Switch branches
- `git merge` - Merge branches
- `git clone` - Copy a repo
- `git pull/push` - Sync with remote

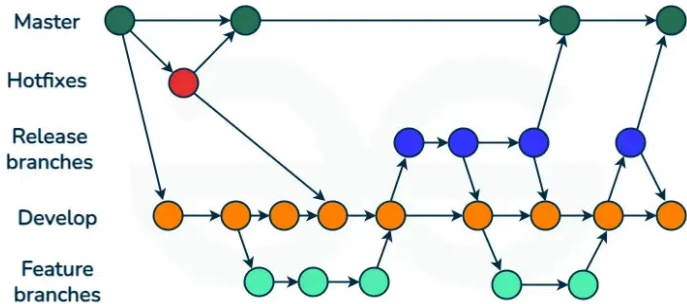
Branching in Git



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- Allows multiple features or bug fixes to be developed in parallel.
- Each branch is an independent line of development.
- `git branch <branch-name>` - Create a new branch.
- `git checkout <branch-name>` - Switch to an existing branch.



Branching strategies



Image Credit: GeeksForGeeks

Collaborating on GitHub



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- Fork - Create a copy of a repository under your GitHub account.
- Clone - Download a repository to your local machine.
- Pull Request - Propose changes to be merged into the original repository.

Get Ready for Hands-On Session



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Hands-On

Now that we've covered the basics, let's dive into a hands-on session where you will:

- Set up a Git repository
- Practice staging, committing, and pushing changes
- Experiment with branching and merging

Make sure you have access to Git and GitHub on your computer to follow along.

Thank You!! I



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References

Any Questions?