1

The Core Concept
(Git vs. GitHub)

Analogy:

```
git merge [branch_name]
```

Git
(The Coffee)

The local tool on your computer that tracks every change.

GitHub
(The Coffee Shop)

The cloud-based home where you store and share your work with

Key Difference: → **Git runs locally;**
GitHub is a remote → **online server.**

2

The Three Stages of Git

(Internal Architecture)

Git moves your work through three distinct areas before it goes to the cloud:

Working Directory

Your local folder where you write code (The "Work" zone)

Staging Area

The intermediate "Check-point" where you prepare files for saving

Local Repository

The digital cabinet where all versions are saved on your PC

Remote Repository

The final destination (GitHub) for backup and sharing.

3

Getting Started (init vs. clone)

Command your work through three distinct areas before it goes to the cloud;

Command	Usage	When to use it
✓ git init	git init	When starting a brand new project locally from scratch.
✓ git clone [URL]	git clone [URL]	When you want to copy an existing project from GitHub to your PC.

✓ **Working Directory**

Your local folder where you write code (The "Work" zone)

✓ **Local Repository**

The digital cabinet where all versions are saved on your PC.

4

Checking the Status (status)

Command: git status

```
git status
```

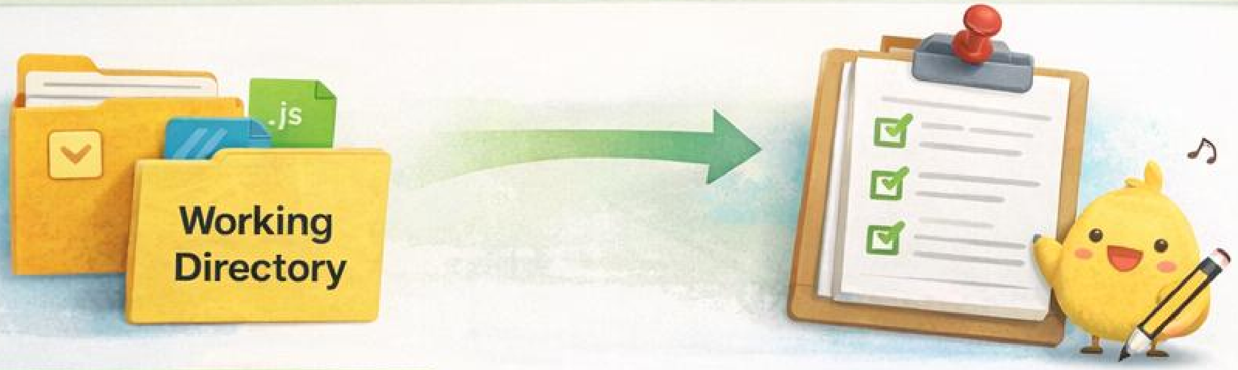
✓ **Red files:** Modified but not yet added to the staging area.

✓ **Green files:** Staged and ready to be committed (saved)

Untracked files: New files Git doesn't know about yet.

5 Staging Your Work (add)

The process of moving changes from the Working Directory to the Staging Area.



git add Commands

- `git add filename.txt` - Stages one specific file.
- `git add .` - Stages everything in the current directory.
- `git add -A` or `git add --all` - Stages every change across the entire project.
- `git add *.txt` - Stages all files with a specific extension.
- `git add *.txt` - Stages all files with a specific extension.

REMEMBER:
The staging area is like a clipboard where you gather changes before committing them to the repository.

6

Saving a Version (commit)

Command: git commit -m

```
git commit -m "Your message here"
```

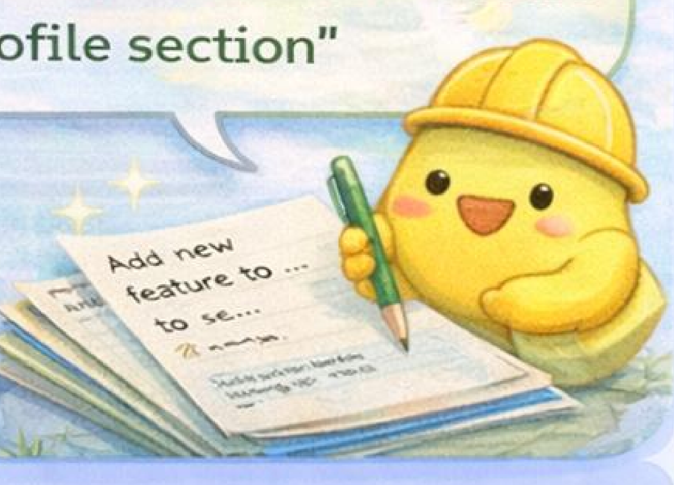
Definition:

"***Commit***" means permanently saving those staged changes into the project's history.

The Message:

Always include a clear description of what you changed so your future self (or team) understands the version.

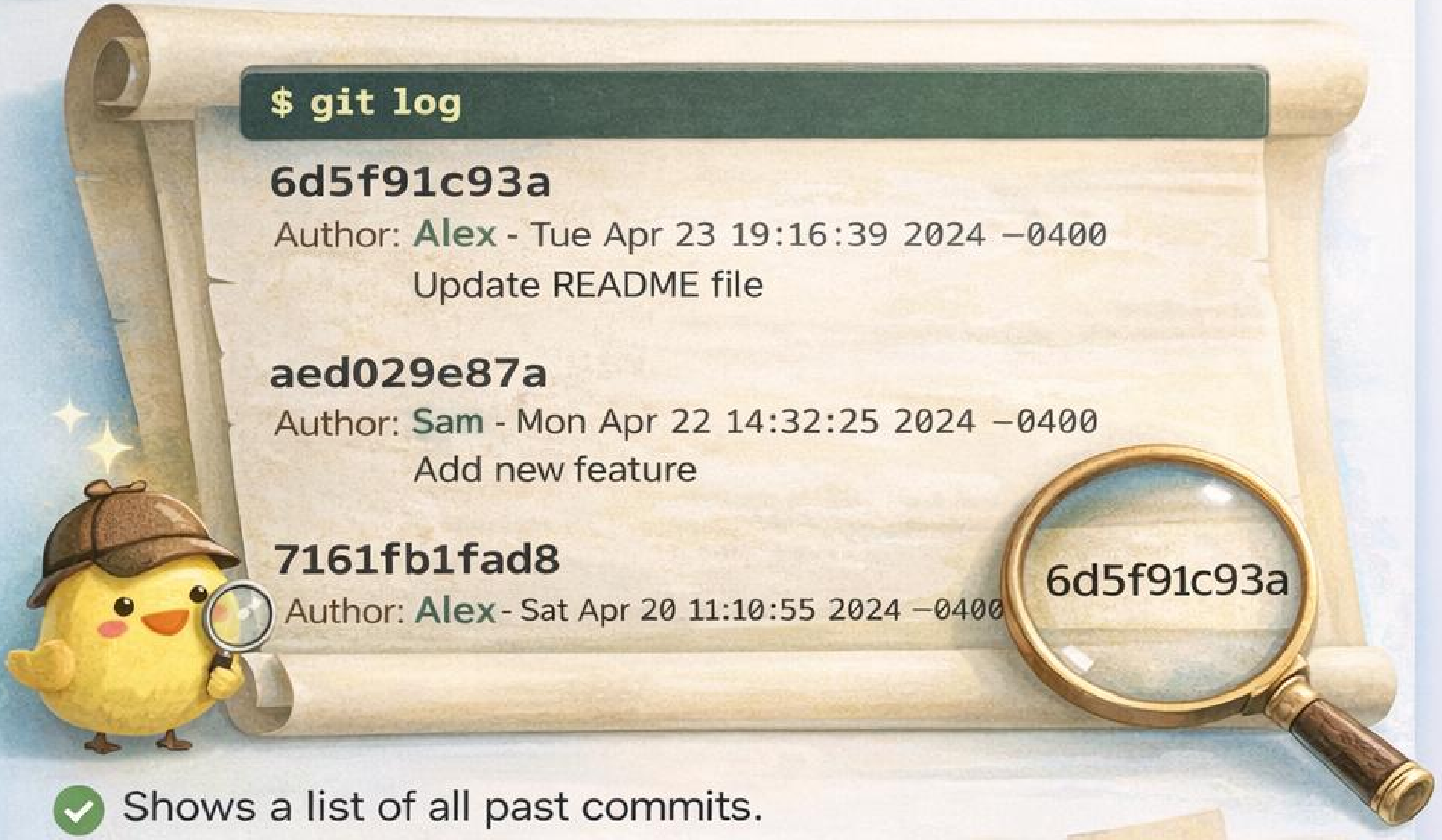
```
git commit -m "Add new feature to user profile section"
```



7

View the History (log)

Command: **git log**



```
$ git log
6d5f91c93a
Author: Alex - Tue Apr 23 19:16:39 2024 –0400
        Update README file

aed029e87a
Author: Sam - Mon Apr 22 14:32:25 2024 –0400
        Add new feature

7161fb1fad8
Author: Alex - Sat Apr 20 11:10:55 2024 –0400
```

- ✓ Shows a list of all past commits.
- ✓ `git log –oneline` Shows a simplified, one-line version of the history.

Commit ID: Each commit has a unique alphanumeric ID (Hash) used for navigation and undoing.

8 Undoing and Reverting

Command What it does

Command	What it does
git reset HEAD~	Undoes the very last commit and brings files back to the working directory.
git reset --hard	**Caution!** Completely deletes all uncommitted changes and reverts to the last save.
git restore [file]	Discards local changes in a specific file to match the last commit.
git revert [ID]	Creates a new commit that reverses the changes of an old commit (best for shared projects).

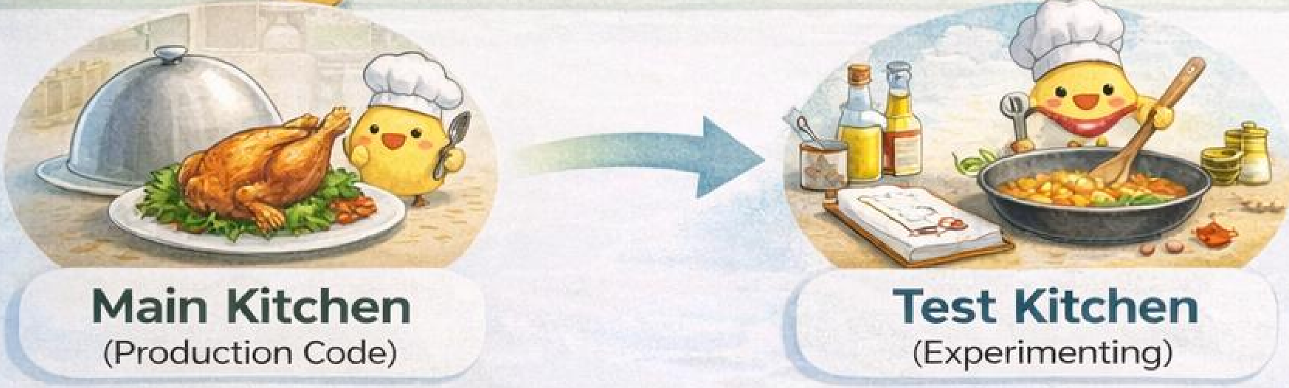
CAUTION!

This command is destructive & cannot be undone!

- ✓ Shows a list of all past commits.
- ✓ `git reset --hard` Caultɩeall/ Deletes all uncommitted changes
- ✓ **git revert [ID]** Creates a new commit that reverses the changes of an old commit (best for shared projects).

9 Branching (The Test Kitchen)

Analogy:



- ✓ **Main Branch:** The “Main Kitchen” (Production code).
- ✓ **Feature Branch:** A “Test Kitchen” where you experiment without breaking the main branch

- ✓ **git branch [name]**: Create a new branch
- ✓ **git checkout [name]:** Switch to that branch
- ✓ **git branch:** List all current branches

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Merging and Conflicts

Command: **git merge [branch_name]**

```
git merge [branch_name]
```

Definition:

Combining changes from a feature branch back into the main branch.

Merge Conflict:

Occurs when the same line of code is changed in two different ways. Git stops and asks you to pick which version to keep.

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Occurs when the same line of code is changed in two different ways. Git stops and asks you to pick which version to keep.

```
git commit -m "Add new feature to user profile section"
```

```
<<<< HEAD
Call new function();
=======
chicken riding();
>>>>>> feature branch.
```

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Stashing (stash)

Command: **git stash**

✓ **Scenario:**

You have unfinished work but need to switch branches quickly.

✓ **Action:**

git stash "hides" your current work in a temporary drawer.

✓ **Retrieve:**

git stash pop brings your work back when you return.

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Syncing with GitHub
(push & pull)

The bridge between your local PC and the Cloud.

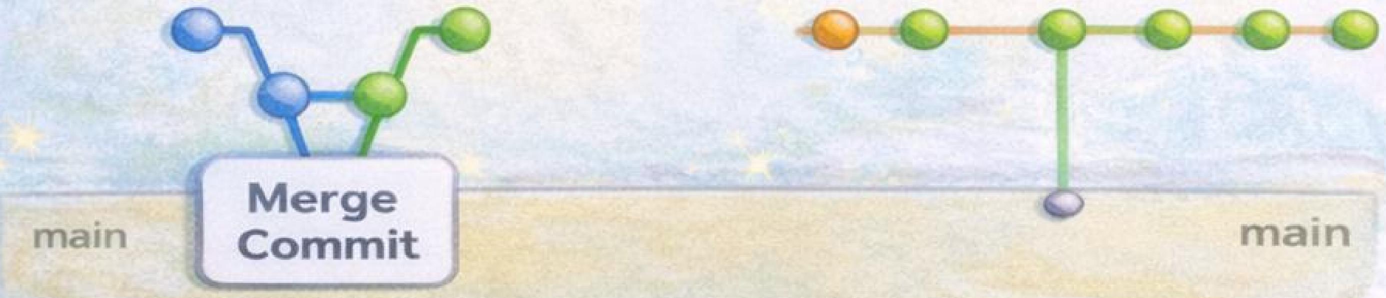
✓ git push origin main	Sends your local commits to GitHub.
✓ git fetch	Checks if there are any new changes on GitHub without applying them.
✓ git pull	Downloads new changes from GitHub AND merges them into your code automatically.

13 Rebase vs. Merge

Merge:

Combines branches and creates a "**Merge Commit.**"

It keeps the history of both branches exactly as they happered.



Rebase (git rebase):

Moves your branch to the "tip" of the main branch. It makes your project history look like one straight line (cleaner but more advanced)

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The Pull Request (PR)

The GitHub Workflow:

✓ **Branch:**

Create a branch for a new feature.

✓ **Commit:**

Make your changes locally.

✓ **Push:**

Send the branch to GitHub.

✓ **Push:**

Send the branch to GitHub.

✓ **Pull Request:**

Open a "Request" on GitHub for the team to review your code before it is merged into the main project.