Git Fundamentals Notes

🔹 What is Git?

- **Git** is a **distributed version control system** used to track changes in source code during software development.
- It allows multiple developers to work on a project simultaneously and maintains a history of every change.

🔹 Git Architecture

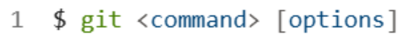
- **Local Machine**: Git is installed here. Developers write code and use Git to track changes.
- **Remote Server**: Platforms like **GitHub**, **BitBucket**, and **GitLab** host repositories online.

🔹 How Git Works

Developer Workflow:

1. Write code.
2. Use Git CLI (Command Line Interface) to track changes.
3. Push changes to a remote server.

Git CLI Syntax:



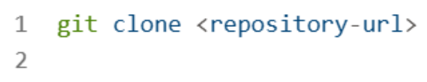
```
$ git <command> [options]
```

Example: $ git status

🔹 Starting a Git Project

🅰️ Method 1: Clone from GitHub

1. Clone the repository:

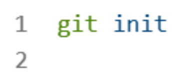


```
git clone <repository-url>
```

2. Make changes locally.
3. Commit changes.
4. Push changes back to GitHub.

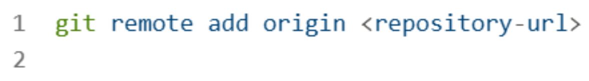
🅱️ Method 2: Initialize Locally

1. Initialize Git:



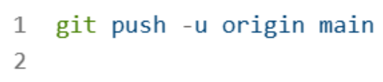
```
git init
```

2. Make changes and commit.
3. Connect to GitHub:



```
git remote add origin <repository-url>
```

4. Push changes:



```
git push -u origin main
```

🔹 Connecting to GitHub

Using HTTPS:

```
git clone https://github.com/username/repo-name.git
```

Using SSH:

- Secure connection via port 22.
- Requires SSH key setup.

🔹 Git Repository Structure

After cloning or initializing:

- .git/ folder: Tracks changes.
- main branch: Default branch.
- origin/main: Remote branch.

🔹 Common Git Commands

Command	Description
git clone <URL>	Clone a remote repository
git init	Initialize a local repository
git status	Show current status of files
git add <file>	Stage file for commit
git commit -m "message"	Commit staged changes
git push origin main	Push commits to GitHub
git log	View commit history
git config --global user.name "Name"	Set global username

Command	Description
git config --global user.email "Email"	Set global email

🔹 Linux Commands in Git Bash

Command	Description
ls	List files and directories
cd ..	Move to parent directory
cat <file>	Display file contents
cd -	Move to the previous directory
cd ~	Move to home directory of the user

🧪 Lab Practice: Hands-On Git

🧭 Objective:

Create a simple HTML project and track it using Git.

🛠️ Steps:

1. **Create a directory and initialize Git**

   ```
   mkdir my-git-project
   cd my-git-project
   git init
   ```

2. **Create a file**

   ```
   touch index.html
   echo "<h1>Hello Git</h1>" > index.html
   ```

3. **Check status and add file**

   ```
   git status
   git add index.html
   ```

4. **Commit the file**

```
git commit -m "Added index.html"
```

5. **Set Git user info (if needed)**

```
git config --global user.name "Your Name"
git config --global user.email "your.email@example.com"
```

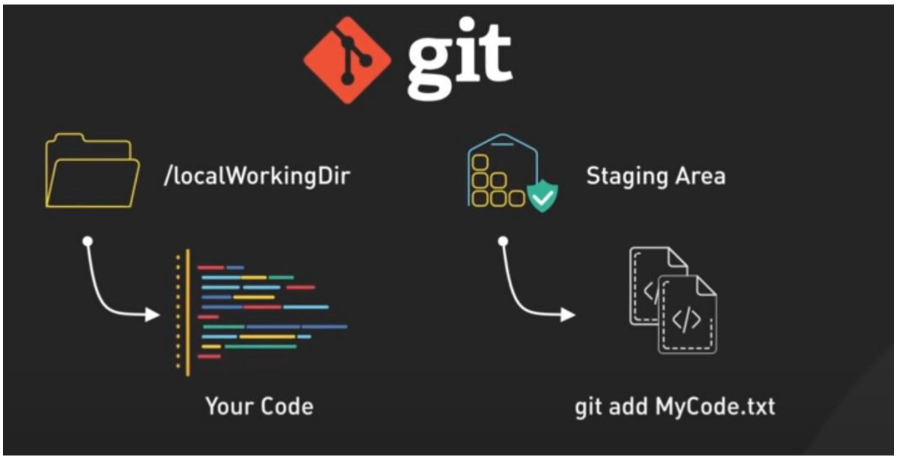
6. **Connect to GitHub and push**

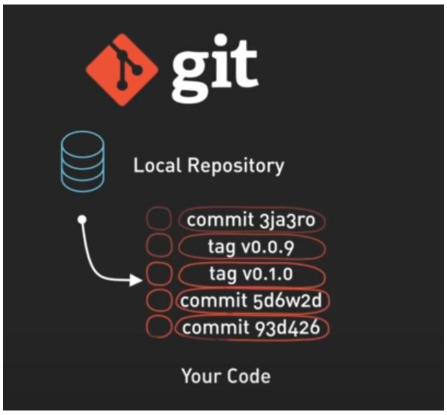
```
git remote add origin https://github.com/yourusername/my-
git-project.git
git push -u origin main
```

Workflow of Git

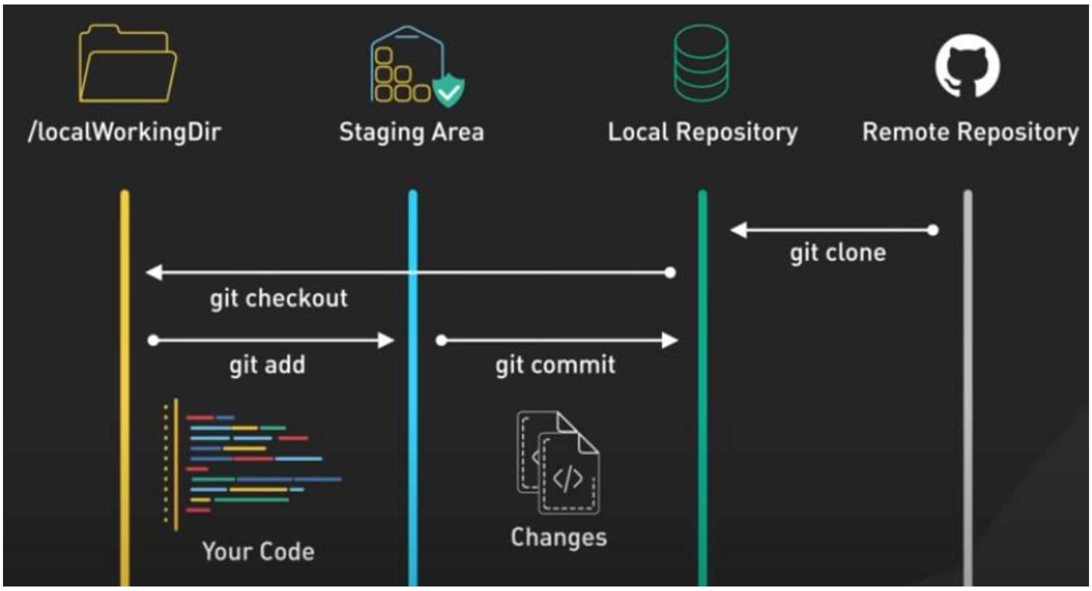
Three areas:

1. **Working Directory** - Your project folder
2. **Staging area** - A temporary holding area for changes before committing
3. **Git repository** - Local repository where we store commits locally on machine.

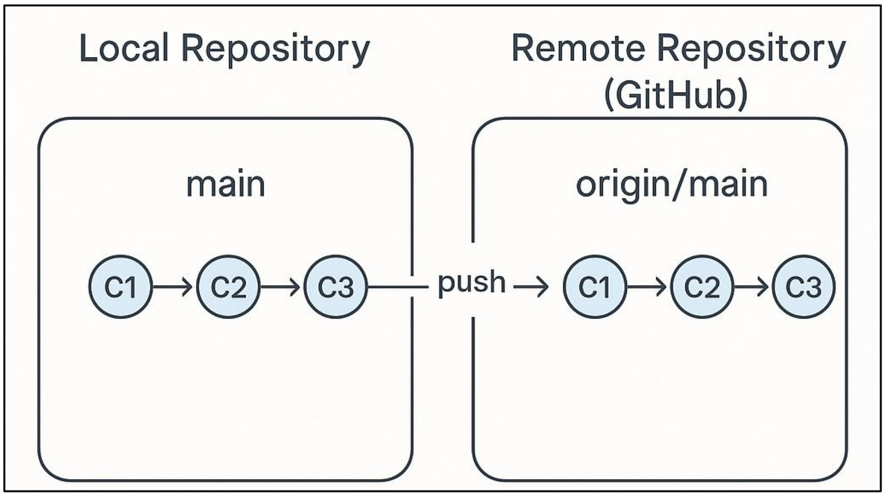




How Git Works?



A diagram illustrating the relationship between local and remote branches with commits in Git. It shows how commits are made locally and then pushed to the remote repository.


Local Repository
Remote Repository (GitHub)
main
C1
C2
C3
push
origin/main
C1
C2
C3