Git, GitHub, and GitHub Actions – Detailed Overview

# 1. Git

## What is Git?

Git is a distributed version control system (VCS) used to track changes in source code during software development.

### Key Features of Git:

* • Version Control: Track every change made to your code.
* • Branching and Merging: Work on new features or fixes without affecting the main code.
* • Distributed: Every developer has a full copy of the codebase, not just a snapshot.
* • Speed & Efficiency: Local commits are fast and allow offline work.

### Common Git Commands:

* git init – Initialize a new Git repo
* git clone <url> – Copy a remote repo locally
* git add <file> – Stage changes for commit
* git commit -m "message" – Save changes with a message
* git push – Send commits to remote repo
* git pull – Fetch and merge changes from remote
* git branch – View or create branches
* git merge – Merge changes from one branch into another

# 2. GitHub

## What is GitHub?

GitHub is a cloud-based platform built around Git. It provides a place to host, share, and collaborate on code with others.

### Key Features of GitHub:

* • Repository Hosting: Store your Git repos online.
* • Pull Requests (PRs): Propose changes and request code reviews.
* • Issues: Track bugs, features, and tasks.
* • Actions: Automate workflows like CI/CD.
* • Security: Manage access control, secrets, code scanning.
* • Collaboration: Team features, wikis, and discussions.

# 3. GitHub Actions

## What is GitHub Actions?

GitHub Actions is GitHub’s built-in CI/CD (Continuous Integration and Continuous Delivery) system.

### Purpose:

* • Running tests on every push
* • Deploying code to production
* • Sending notifications
* • Linting or formatting code

### How It Works:

You define workflows using YAML files inside `.github/workflows/`.

### Example Workflow:

name: CI Pipeline  
on: [push]  
jobs:  
 build:  
 runs-on: ubuntu-latest  
 steps:  
 - uses: actions/checkout@v3  
 - name: Install dependencies  
 run: npm install  
 - name: Run tests  
 run: npm test

### Key Concepts:

* Workflow: The overall automation script (YAML file)
* Jobs: A collection of steps run in the same environment
* Steps: Individual actions (like install, test, deploy)
* Runners: The virtual machines that run your jobs
* Marketplace: Reusable actions published by the community

# Summary – When to Use What

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| --- | --- |
| Use Case | Tool |
| Track code changes locally | Git |
| Share code with a team | GitHub |
| Automate build/test/deploy | GitHub Actions |
| Create issues and roadmap | GitHub Issues & Projects |
| Review and merge code safely | GitHub Pull Requests |