

Introduction to Git Branching

Git is a distributed version control system used to track changes in source code during software development. One of the most powerful features of Git is branching, which allows developers to diverge from the main line of development and work independently.

What is a Git Branch?

A branch in Git is essentially a pointer to one of the commits in your repository. It allows you to isolate your work from the main codebase (usually the `main` or `master` branch), making it easier to develop features, fix bugs, or experiment with new ideas without affecting the stable code.

Example:

```
git branch feature-login
```

This creates a new branch named `feature-login`.

(1)Switching Branches:-

To switch from one branch to another:

```
git checkout feature-login
```

As of Git 2.23, you can also use:

```
git switch feature-login
```

(2)Creating and Switching in One Step:-

```
git checkout -b feature-login
```

or

```
git switch -c feature-login
```

(3)Merging Branches:-

Once your work on a branch is complete, you can merge it back into the main branch.

Switch to the branch you want to merge into (e.g., `main`)

```
git checkout main
```

(4)Merge the feature branch:-

```
git merge feature-login
```

This will integrate the changes from `feature-login` into `main`.

(5)Fast-Forward vs. Three-Way Merge:-

- Fast-Forward Merge: When the `main` branch has not diverged since branching off, Git simply moves the `main` branch pointer forward.
- Three-Way Merge: When both `main` and the feature branch have new commits, Git performs a three-way merge.

(6)Handling Merge Conflicts:-

Sometimes Git can't automatically merge changes. This happens when the same part of the file has been modified in both branches.

To resolve:-

Git will mark the conflict in the file.

Edit the file to resolve the conflict.

Add the resolved file:

```
git add <filename>
```

Commit the merge:

```
git commit
```

(7)Deleting a Merged Branch:-

Once merged, you can safely delete the feature branch:

```
git branch -d feature-login
```

Use `-D` to force delete:

```
git branch -D feature-login
```