Lab: Practice branching and resolving conflicts in a Git repository.

This lab will walk you through practicing branching and resolving conflicts in a Git repository using Ubuntu and Git CLI. Separate scenarios for using the CLI and VS Code are provided.

Prerequisites

- Git installed on your Ubuntu system. Verify by running:

  ```
  git --version
  ```

- Basic understanding of Git commands.
- A text editor like `nano`, `vim`, or `code` (VS Code) for editing files.
- VS Code installed.
- Install the GitLens extension in VS Code for better Git visualization.

Scenario 1: Using Git CLI

Step 1: Setup a Git Repository

1. **Create a directory for the repository:**

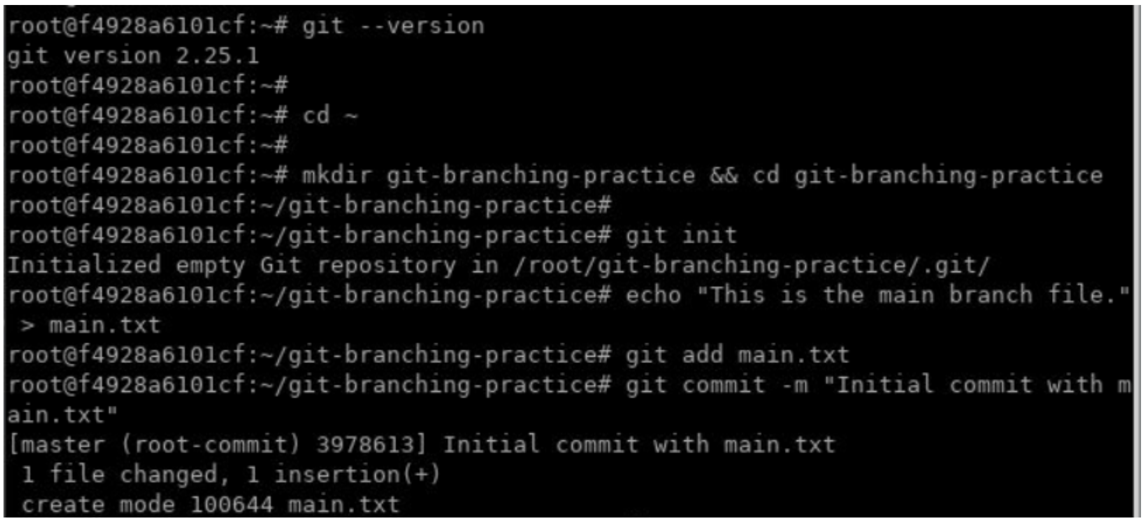
   ```
   cd ~

   mkdir git-branching-practice && cd git-branching-practice
   ```

2. **Initialize a Git repository:**

   ```
   git init
   ```

3. **Create a file and commit it to the repository:**

   ```
   echo "This is the main branch file." > main.txt
   git add main.txt
   git commit -m "Initial commit with main.txt"
   ```



```
root@f4928a6101cf:~# git --version
git version 2.25.1
root@f4928a6101cf:~#
root@f4928a6101cf:~# cd ~
root@f4928a6101cf:~#
root@f4928a6101cf:~# mkdir git-branching-practice && cd git-branching-practice
root@f4928a6101cf:~/git-branching-practice#
root@f4928a6101cf:~/git-branching-practice# git init
Initialized empty Git repository in /root/git-branching-practice/.git/
root@f4928a6101cf:~/git-branching-practice# echo "This is the main branch file."
 > main.txt
root@f4928a6101cf:~/git-branching-practice# git add main.txt
root@f4928a6101cf:~/git-branching-practice# git commit -m "Initial commit with m
ain.txt"
[master (root-commit) 3978613] Initial commit with main.txt
 1 file changed, 1 insertion(+)
 create mode 100644 main.txt
```

Step 2: Create and Work on a Branch

1. **Create a new branch:**

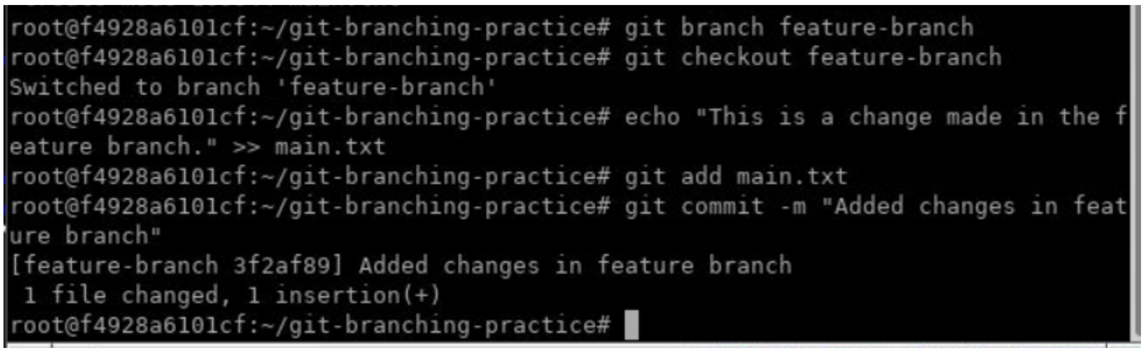
```
git branch feature-branch
```

2. **Switch to the new branch:**

```
git checkout feature-branch
```

3. **Modify the file on the new branch:**

```
echo "This is a change made in the feature branch." >> main.txt
git add main.txt
git commit -m "Added changes in feature branch"
```



```
root@f4928a6101cf:~/git-branching-practice# git branch feature-branch
root@f4928a6101cf:~/git-branching-practice# git checkout feature-branch
Switched to branch 'feature-branch'
root@f4928a6101cf:~/git-branching-practice# echo "This is a change made in the f
eature branch." >> main.txt
root@f4928a6101cf:~/git-branching-practice# git add main.txt
root@f4928a6101cf:~/git-branching-practice# git commit -m "Added changes in feat
ure branch"
[feature-branch 3f2af89] Added changes in feature branch
 1 file changed, 1 insertion(+)
root@f4928a6101cf:~/git-branching-practice#
```

Step 3: Create a Conflict

1. **Switch back to the `master` branch:**

```
git checkout master
```

2. **Make a conflicting change in the file on the `main` branch:**

```
echo "This is a change made in the main branch." >> main.txt
git add main.txt
git commit -m "Added changes in main branch"
```

3. **Merge the `feature-branch` into `main` to create a conflict:**

   ```
   git merge feature-branch
   ```

   Git will notify you of a merge conflict in `main.txt`.

Step 4: Resolve the Conflict

1. **View the conflicted file:**

   ```
   nano main.txt
   ```

   The file will include markers like this:

   ```
   <<<<<<< HEAD
   This is a change made in the main branch.
   =======
   This is a change made in the feature branch.
   >>>>>>> feature-branch
   ```

2. **Manually edit the file to resolve the conflict.** For example:

   ```
   This is the main branch file.
   This is a change made in the main branch and the feature branch.
   ```

3. **Stage the resolved file:**

   ```
   git add main.txt
   ```

4. **Complete the merge:**

   ```
   git commit -m "Resolved conflict between main and feature-branch"
   ```

Step 5: Verify the Merge

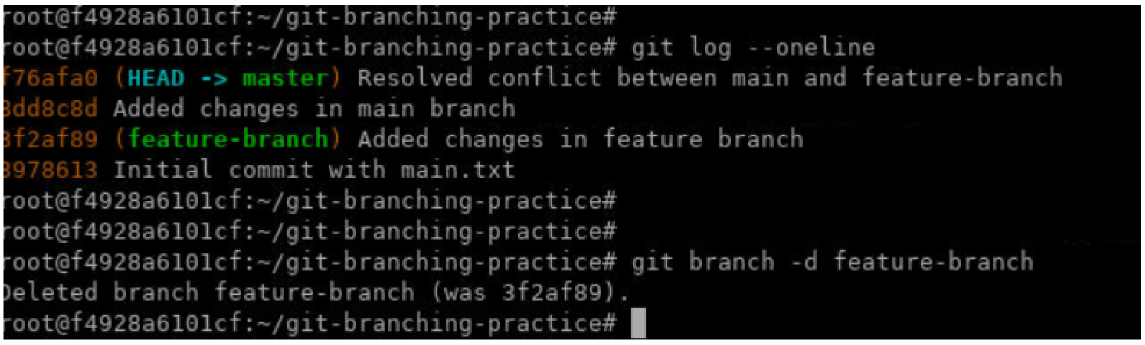
1. **Check the commit history:**

   ```
   git log --oneline
   ```

2. **Ensure the `main` branch has the merged changes.**

3. **Delete the feature branch (optional):**

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



```
root@f4928a6101cf:~/git-branching-practice#
root@f4928a6101cf:~/git-branching-practice# git log --oneline
f76afa0 (HEAD -> master) Resolved conflict between main and feature-branch
3dd8c8d Added changes in main branch
3f2af89 (feature-branch) Added changes in feature branch
8978613 Initial commit with main.txt
root@f4928a6101cf:~/git-branching-practice#
root@f4928a6101cf:~/git-branching-practice#
root@f4928a6101cf:~/git-branching-practice# git branch -d feature-branch
Deleted branch feature-branch (was 3f2af89).
root@f4928a6101cf:~/git-branching-practice#
```

Scenario 2: Using VS Code

Step 1: Setup a Git Repository

1. **Create a directory for the repository:**

```
rm -r git-branching-practice

mkdir git-branching-practice && cd git-branching-practice
```

2. **Initialize a Git repository:**

```
git init
```

3. **Create a file and commit it to the repository:**

```
echo "This is the main branch file." > main.txt
git add main.txt
git commit -m "Initial commit with main.txt"
```

4. **Open the repository in VS Code**

Step 2: Create and Work on a Branch

1. **Create a new branch:**
   - Open the Source Control tab in VS Code.
   - Click on the branch name in the bottom-left corner.
   - Select `Create new branch` and name it `feature-branch`.
2. **Switch to the new branch:**
   - Use the same branch menu in the bottom-left corner to switch to `feature-branch`.
3. **Modify the file on the new branch:**
   - Open `main.txt` in VS Code.
   - Add the line: `This is a change made in the feature branch.`
   - Save the file.
   - Use the Source Control tab to stage and commit the change with a message: `Added changes in feature branch`.

Step 3: Create a Conflict

1. **Switch back to the `main` branch:**
   - Use the branch menu in the bottom-left corner to switch back to `main`.
2. **Make a conflicting change in the file on the `main` branch:**
   - Open `main.txt` in VS Code.
   - Add the line: `This is a change made in the main branch.`
   - Save the file.
   - Use the Source Control tab to stage and commit the change with a message: `Added changes in main branch`.
3. **Merge the `feature-branch` into `main` to create a conflict:**
   - Use the terminal in VS Code to run:

     ```
     git merge feature-branch
     ```

   - VS Code will highlight the conflict in `main.txt`.

Step 4: Resolve the Conflict

1. **Open the conflicted file:**
   - Open `main.txt` in VS Code. The editor will highlight the conflicting sections.
2. **Use the VS Code conflict resolution tool:**
   - Click on `Accept Current Change`, `Accept Incoming Change`, or `Accept Both Changes` as appropriate.
   - Alternatively, manually edit the file in the editor.
3. **Stage and commit the resolved file:**
   - Use the Source Control tab to stage and commit the file with a message: `Resolved conflict between main and feature-branch`.

Step 5: Verify the Merge

1. **Check the commit history:**
   - Use the GitLens extension in VS Code to view the commit history graphically.
2. **Delete the feature branch (optional):**
   - Open the terminal in VS Code and run:

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

Summary

In this guide, you:

- Created a Git repository.

- Practiced branching.
- Created a conflict and resolved it using both CLI and VS Code.
- Cleaned up and verified the merge.