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| VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC | **Department of Information Technology** |

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| Semester | T.E. Semester VI – INFT |
| Subject | DevOps Lab |
| Laboratory Teacher: | Prof. Bushra Shaikh |
| Laboratory | CC02 |

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|---|---|---|
| Student Name | Arkan Khan | |
| Roll Number | 22101A0049 | |
| Grade and Subject Teacher's Signature | | |

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| Experiment Number | 2 | |
| Experiment Title | Experiment 2: Automating Version Control and Code Collaboration of TE Mini Project with Git | |
| Problem Statement | To Perform Code Collaboration of TE Mini Project using GIT workflow | |
| Resources / Apparatus Required | Hardware: Desktop/Laptop | Software: Git & Github |

**Implementation:**

- Set up a Git repository for a project (either create a new project or use an existing one).
- Collaborate with a team member by creating multiple branches for different features.
- Implement the following:
  - Create a feature branch and make changes to the code.
  - Push changes to the remote repository.
  - Use a Git cheat sheet to commit, merge branches, and resolve conflicts.
  - Create a pull request (PR) and ensure code review processes are followed.

## Step 1: Initialize a Git Repository and Push It to GitHub

### 1.1 Initialize a Git Repository Locally

- Navigate to your project directory on your local machine (or create a new project folder).
- Open your terminal and run the following command to initialize a Git repository:
  `git init`

### 1.2 Add Files to the Repository

- Add a new file or make changes to existing files. For example, create a `README.md` file in the project folder:
  `echo "# BG Changer" > README.md`

### 1.3 Stage and Commit Files

- Stage the files for commit using:
  `git add .`

- Commit the staged files with a message:
  git commit -m "Initial commit"

### 1.4 Create a GitHub Repository

- Go to GitHub and create a new repository. You can name it something like "BgChanger".
- Copy the URL of the GitHub repository, e.g., https://github.com/Arkan-Khan/BgChanger.git

### 1.5 Push to GitHub

- Set the remote repository URL:
  `git remote add origin https://github.com/Arkan-Khan/BgChanger.git`

- Push the local repository to GitHub:
  `git push -u origin main`

## Step 2: Create and Merge Multiple Feature Branches

### 2.1 Create a New Feature Branch

- Create a new branch for a feature. For example, create a `feature-color` branch:

  ```
  git checkout -b feature-color
  ```

### 2.2 Make Changes in the Feature Branch

- Add a new file or modify an existing file in the `feature-color` branch. For example, modify `README.md`:

  ```
  echo "color 1" >> README.md
  ```

### 2.3 Stage and Commit Changes

- Stage the changes and commit them:

  ```
  git add README.md
  ```

```
git commit -m "Add color 1 to README"
```

**2.4 Push the Feature Branch to GitHub**

- Push the feature branch to GitHub:
  `git push origin feature-color`

**2.5 Create Another Feature Branch**

- Create another branch for a different feature, for example, `feature-button`:

```
git checkout -b feature-button
```

**2.6 Make Changes in the `feature-button` Branch**

- Modify the same file (`README.md`), but with content related to button:

```
echo "button feature" >> README.md
```

**2.7 Stage and Commit Changes**

- Stage and commit the changes:

```
git add README.md
git commit -m "Add button feature to README"
```

**2.8 Push the `feature-button` Branch to GitHub**

- Push the button branch to GitHub:

```
git push origin feature-button
```

## Step 3: Simulate a Merge Conflict and Resolve It

**3.1 Switch to `main` Branch**

- Now switch back to the `main` branch:

```
git checkout main
```

**3.2 Merge `feature-color` into `main`**

- Merge the `feature-color` branch into the `main` branch:

```
git merge feature-color
```

- Since the changes are in different parts of the file, the merge will succeed without conflict.

**3.3 Merge `feature-button` into `main`**

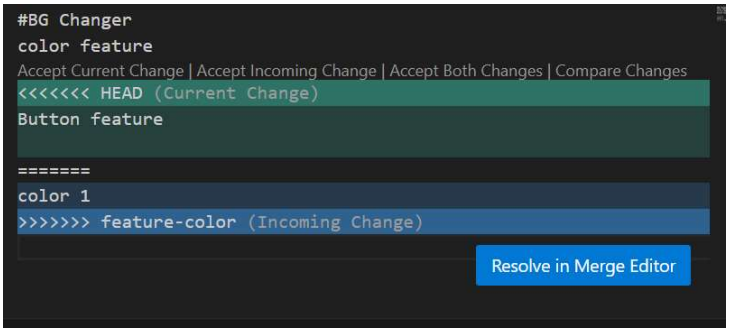
- Now, try to merge the `feature-button` branch:

```
git merge feature-button
```

- Since the `feature-button` branch made changes to the same file (`README.md`) at the same location as `feature-color`, Git will raise a merge conflict.

### 3.4 Resolve the Merge Conflict

- Open the `README.md` file. You will see something like this:




- Edit the file to resolve

### 3.5 Stage the Resolved Conflict

- Once the conflict is resolved, stage the file:
  `git add README.md`

### 3.6 Commit the Merge

- Commit the merge with a message:
  `git commit -m "Resolve merge conflict between feature-color and feature-button "`

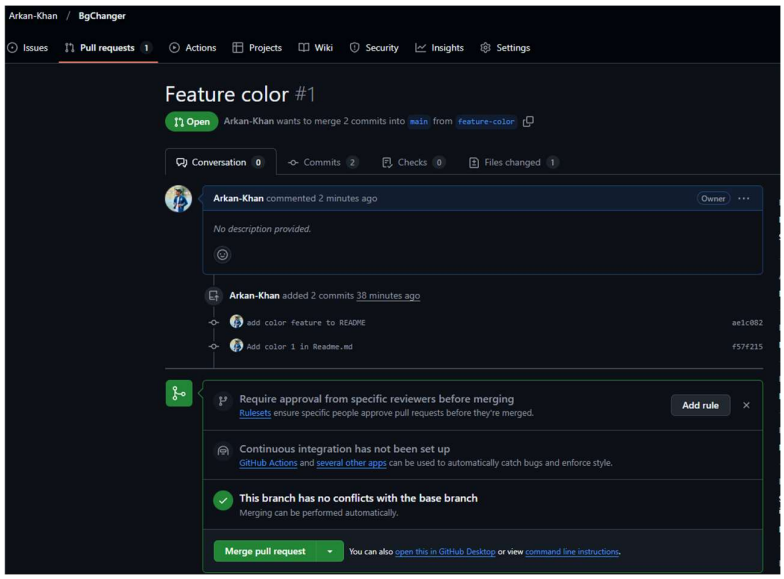
## Step 4: Perform a Pull Request Review and Handle the Integration Process

### 4.1 Create a Pull Request (PR) on GitHub

- Go to your repository on GitHub.
- You should see a button to create a Pull Request for the branches you've pushed (`feature-color` and `feature-button`).
- Click on "New Pull Request" and select the `feature-color` branch and compare it with `main`.
- After reviewing the changes, click "Create Pull Request."
- Add a description of the changes and create the PR.

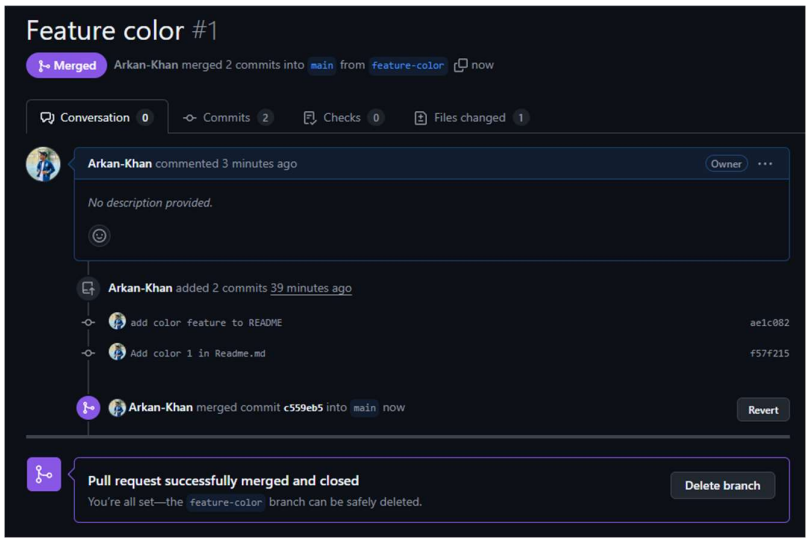
### 4.2 Review the Pull Request

- Review the changes in the pull request.
- You can see the changes made and leave comments on specific lines of code if necessary.
- You can ask a team member to review it as well or approve it yourself.




### 4.3 Merge the Pull Request

- After the PR review, click the "Merge pull request" button.
- Choose "Confirm merge" to integrate the changes from `feature-color` into `main`.




### 4.4 Repeat the Process for `feature-button`

- Repeat the same process for the `feature-button` branch.
- Create a new PR for `feature-button`, review it, and merge it into `main`.

### 4.5 Clean Up the Branches

- After successfully merging the feature branches, delete them from GitHub (optional):

```
git push origin --delete feature-color
git push origin --delete feature-button
```