Lab 2: Collaborative Development

In this lab, we will look into Gitlab branches and anaging merge requests.

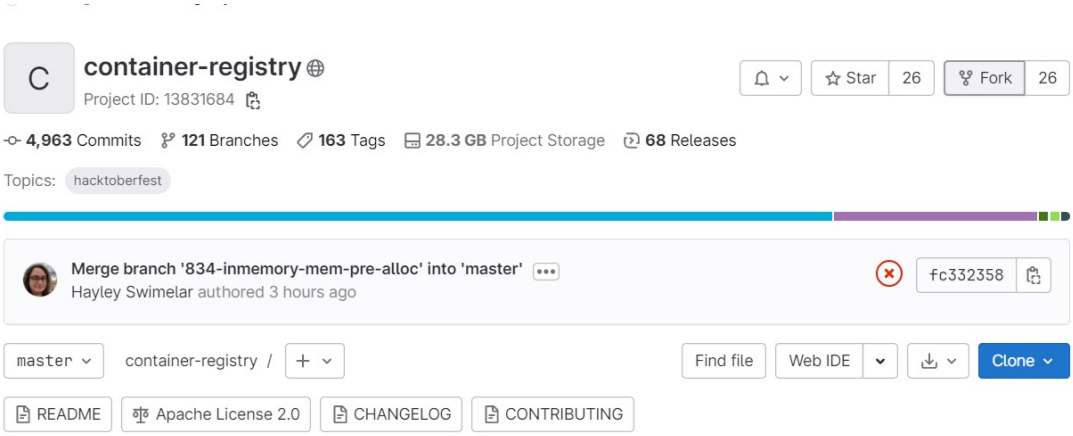
Gitlab Branches

Fork is a duplicate of your original repository in which you can make the changes without affecting the original project.

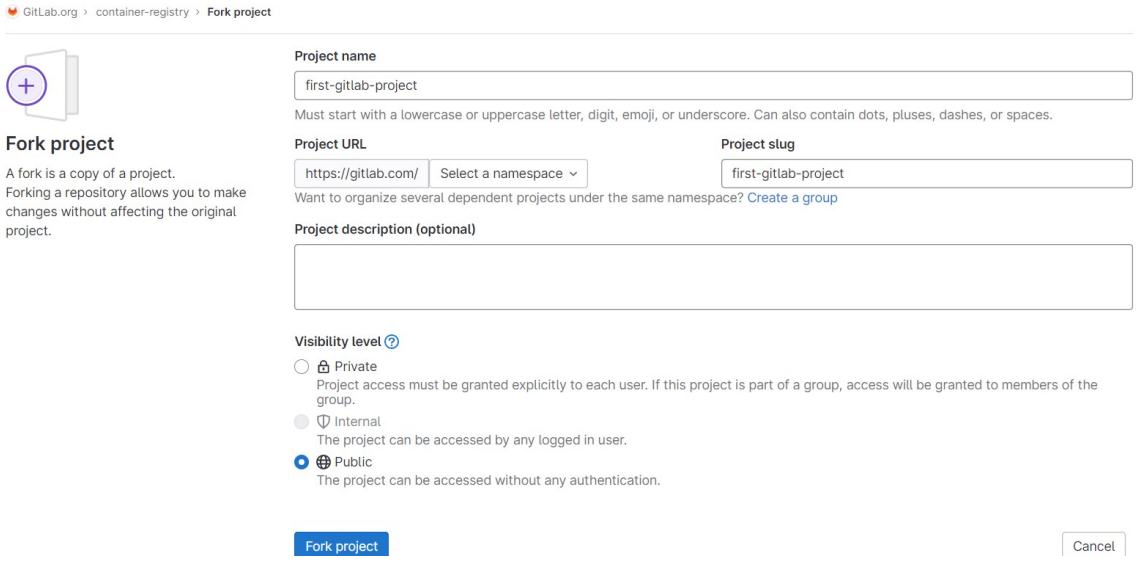
Forking a Project

Step 1 – To fork a project, Open following URL after login in your gitlab account and click on the *Fork* button as shown below –

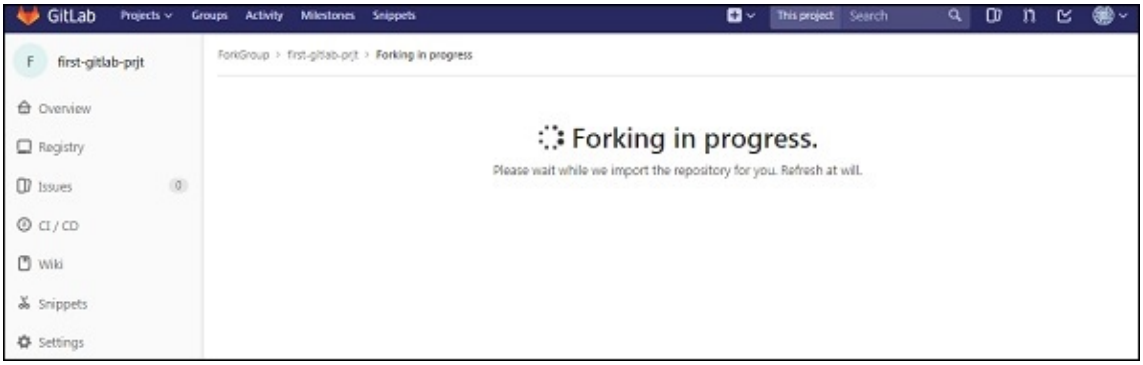
```
https://gitlab.com/gitlab-org/container-registry
```



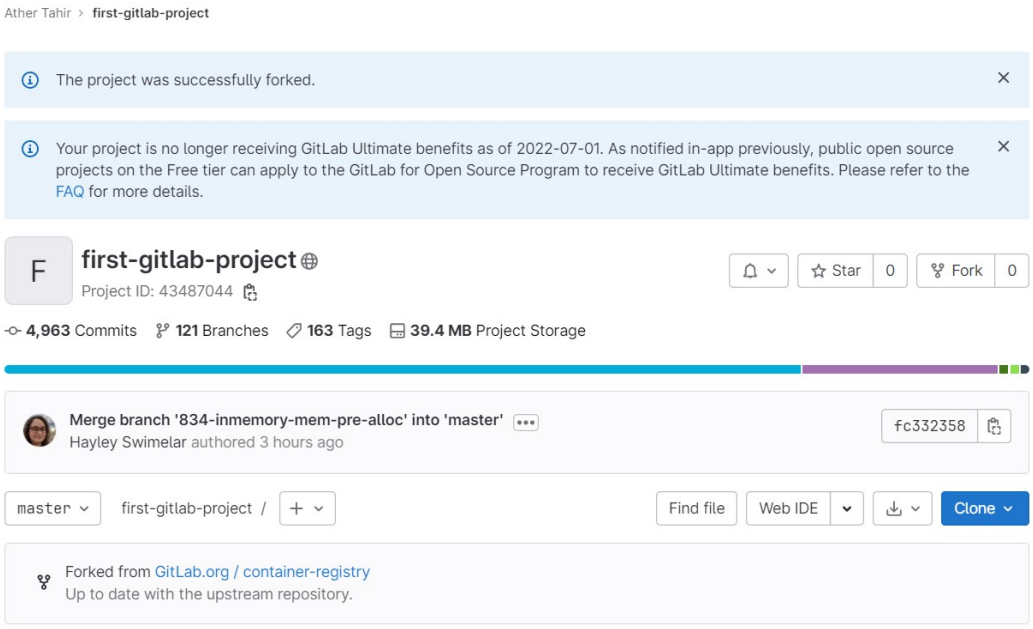
Step 2 – After clicking the `Fork` button the project, enter project name as shown below:



Step 3 – Next it will start processing of forking a project for sometime as shown below –



Step 4 – It will display the success message after completion of forking the project process –

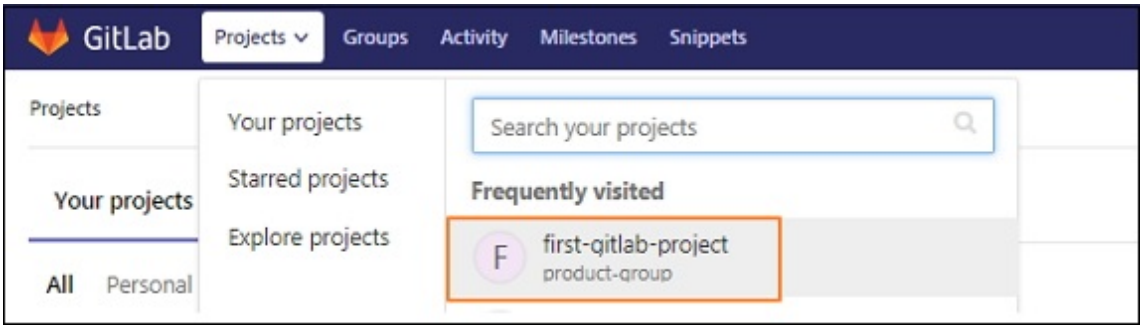


GitLab - Create a Branch

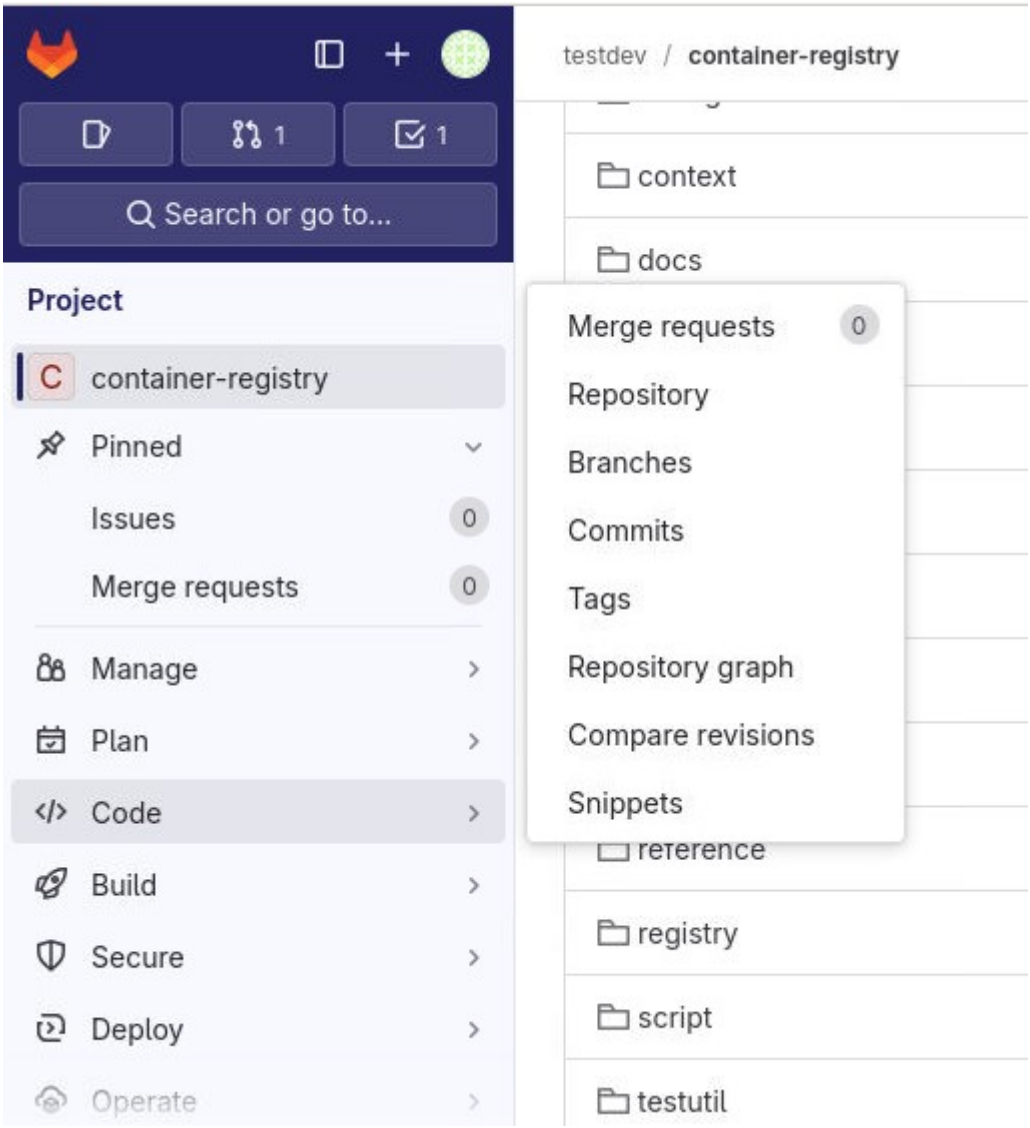
Branch is independent line and part of the development process. The creation of branch involves following steps.

Creating a Branch

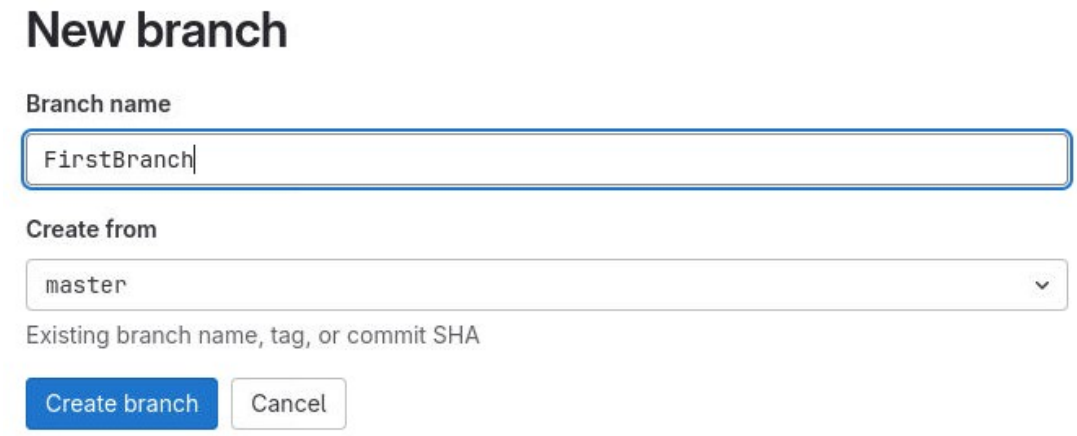
Step 1 – Login to your GitLab account and go to your project under *Projects* section.



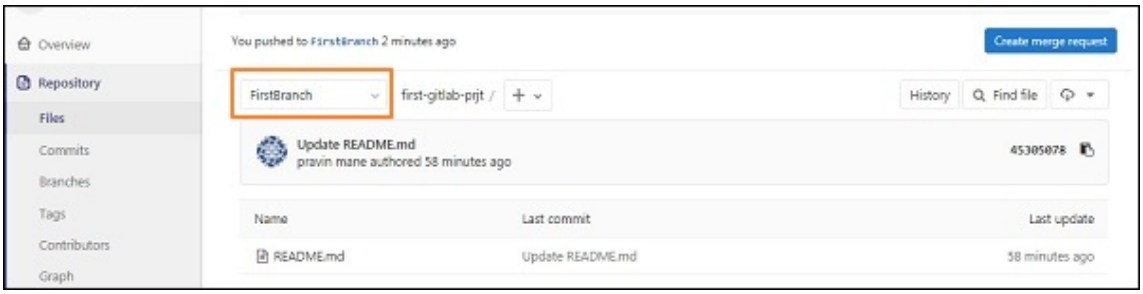
Step 2 – To create a branch, click on the *Branches* option under the *Code* section and click on the *New branch* button.



Step 3 – In the *New branch* screen, enter the name for branch and click on the *Create branch* button.

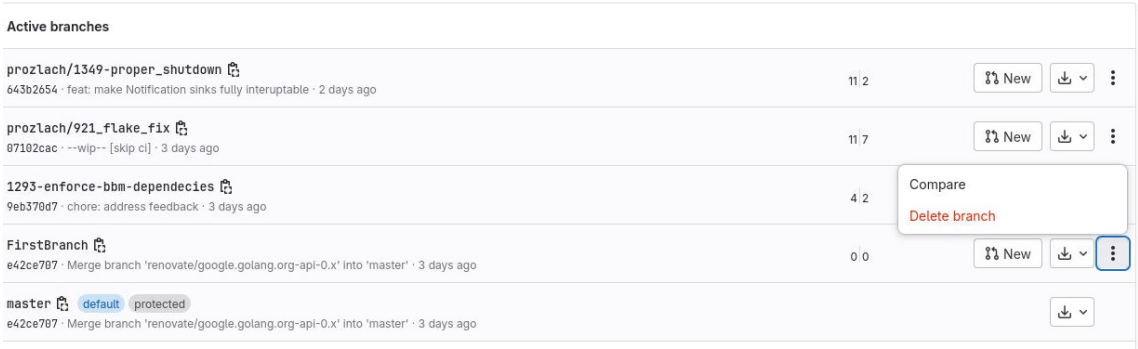


Step 4 – After creating branch, you will get a below screen along with the created branch.

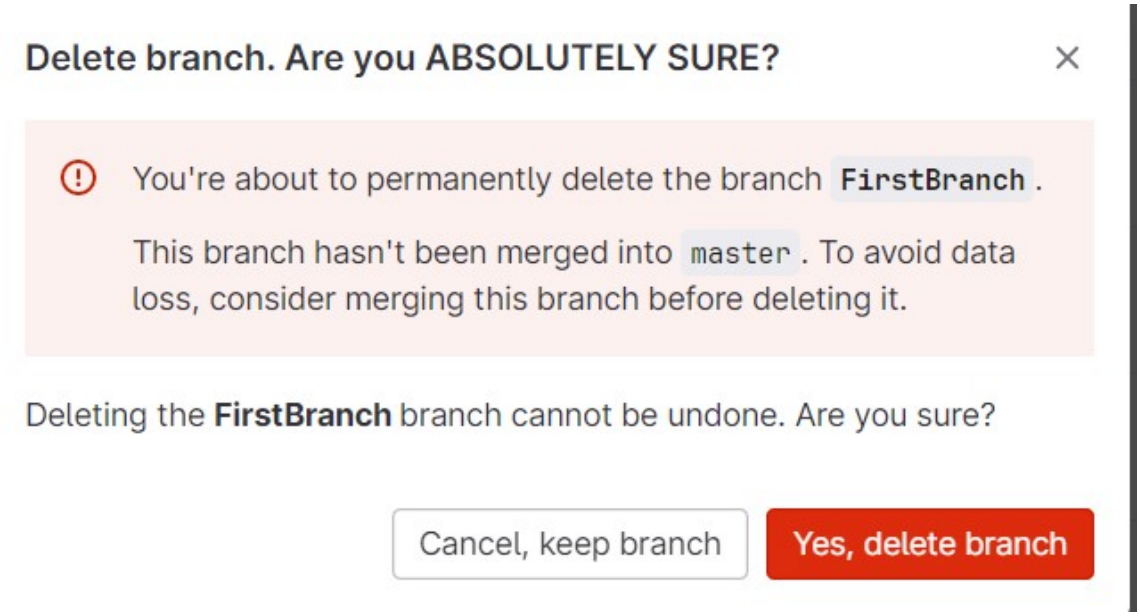


GitLab - Delete a Branch

Step 1 – To create a branch, click on the *Branches* option under the *Repository* section and click on the *Delete* button next to branch name.



Step 2 – Confirm to delete branch as shown below:



Task: Managing Merge Requests

There are many different ways to create a merge request.

Task: Make changes in Gitlab Repo

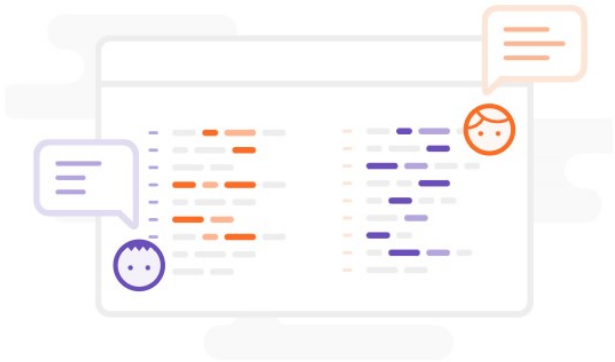
1. Switch to `example-tutorial-branch` in terminal of repo created in `lab 1`.
2. Make changes in `README.md` and push the changes.

```
root@982e2c2fb78d:~/Desktop/my-sample-project# git checkout example-tutorial-branch
Switched to branch 'example-tutorial-branch'
root@982e2c2fb78d:~/Desktop/my-sample-project# echo "Updated" >> README.md
root@982e2c2fb78d:~/Desktop/my-sample-project#
root@982e2c2fb78d:~/Desktop/my-sample-project# git add README.md
root@982e2c2fb78d:~/Desktop/my-sample-project# git commit -m "I added more text to the README file"
[example-tutorial-branch 37d0299] I added more text to the README file
 1 file changed, 1 insertion(+)
root@982e2c2fb78d:~/Desktop/my-sample-project#
root@982e2c2fb78d:~/Desktop/my-sample-project# git push
```

From the merge request list

You can create a merge request from the list of merge requests.

1. On the top bar, select **Main menu > Projects** and find your project.
2. On the left menu, select **Merge requests**.
3. In the upper right, select **New merge request**.

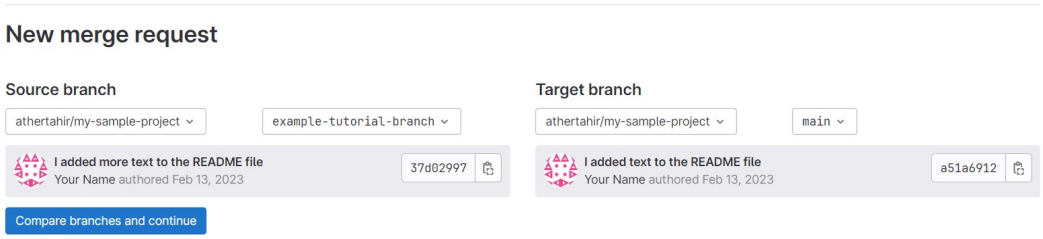


Merge requests are a place to propose changes you've made to a project and discuss those changes with others

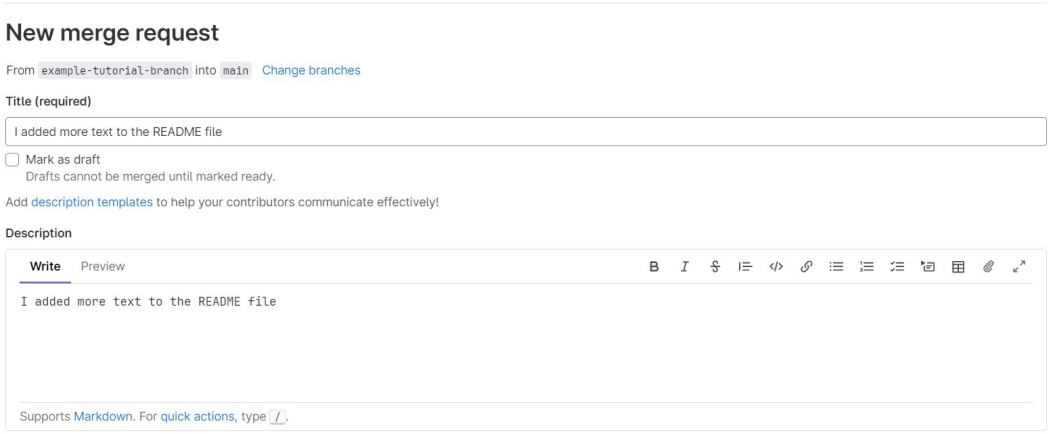
Interested parties can even contribute by pushing commits if they want to.

New merge request

4. Select a source and target branch and then **Compare branches and continue**.

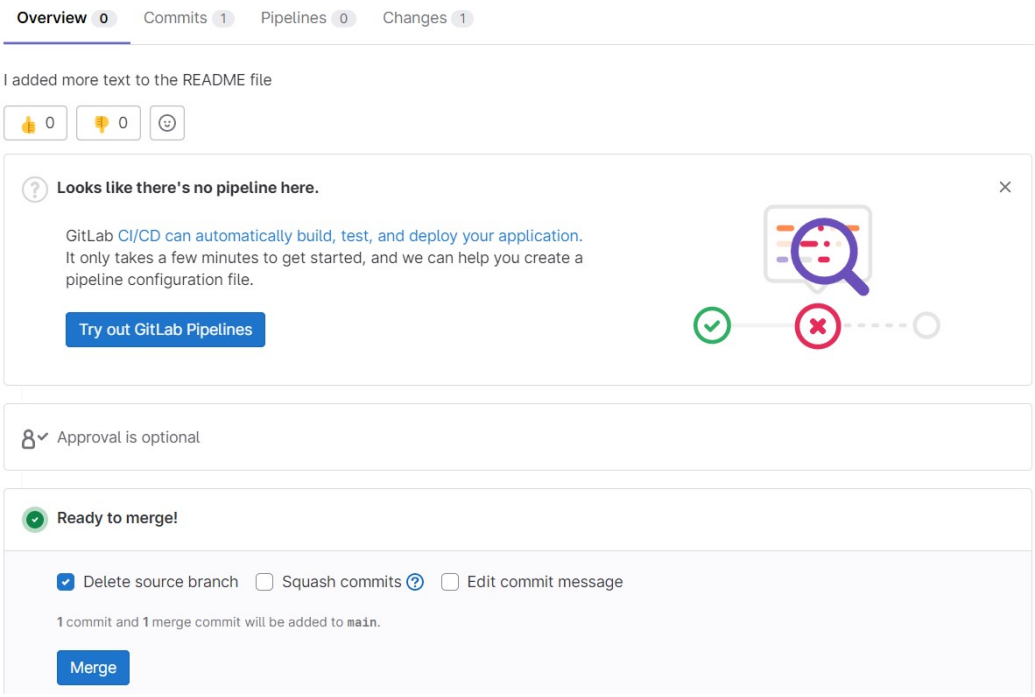


5. Fill out the fields and select **Create merge request**.



Merge requests are designed around a one-to-one (1:1) branch relationship. Only one open merge request may be associated with a given target branch at a time.

6. You can merge the **merge request** as shown below:



Revert a merge request

You can revert an entire merge request in GitLab. When you revert a commit in Git, you create a new commit that reverses all actions taken in the original commit:

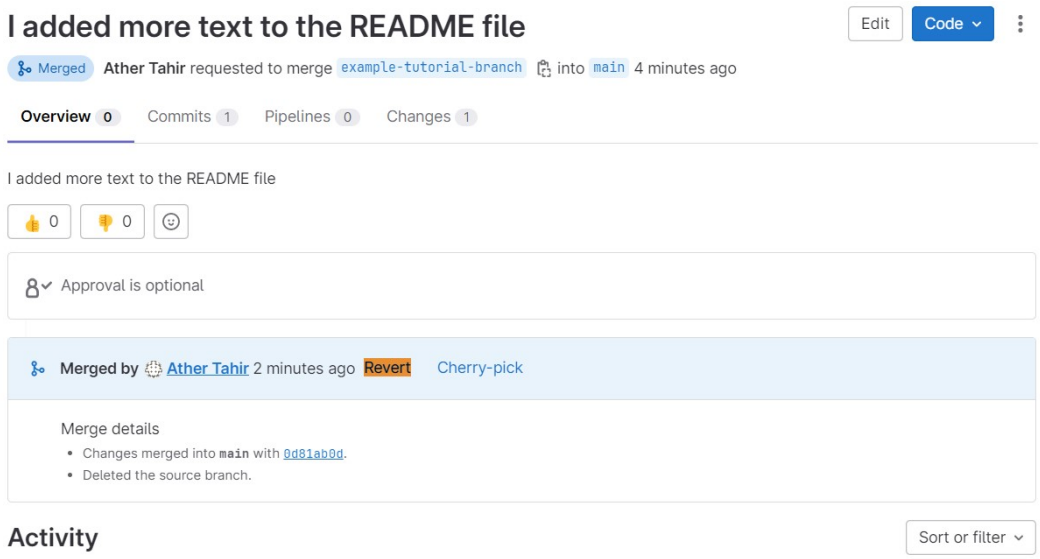
After a merge request is merged, you can revert all changes in the merge request.

Prerequisites:

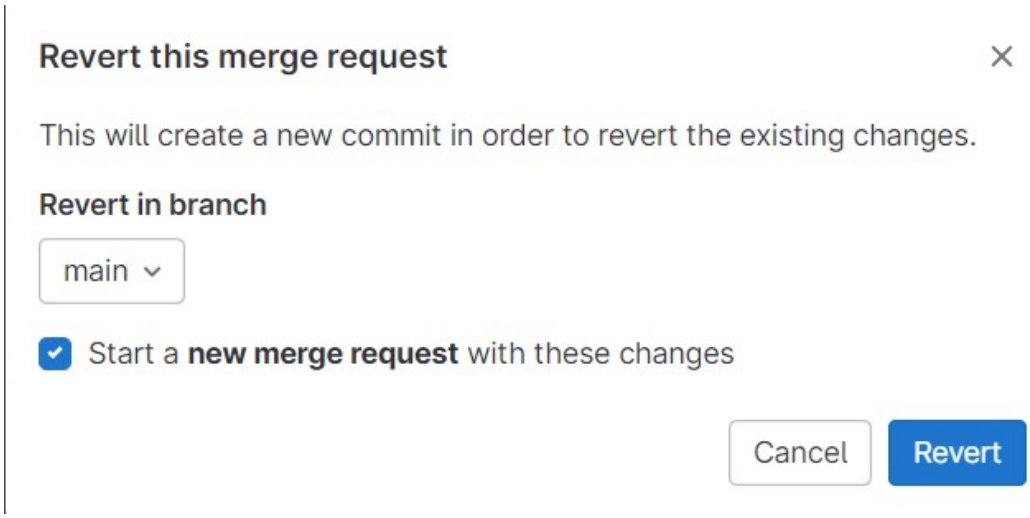
- You must have a role in the project that allows you to edit merge requests, and add code to the repository.
- Your project must use the [merge method] **Merge Commit**, which is set in the project's **Settings > General > Merge request**. You can't revert fast-forwarded commits from the GitLab UI.

To do this:

1. On the top bar, select **Main menu > Projects** and find your project.
2. On the left sidebar, select **Merge requests** and identify your merge request.
3. Scroll to the merge request reports area, and find the report showing when the merge request was merged.
4. Select **Revert**.



5. In **Revert in branch**, select the branch to revert your changes into.
6. Optional. Select **Start a new merge request** to start a new merge request with the new revert commit.
7. Select **Revert**.



The option to **Revert** is no longer shown after a merge request is reverted.

Task Create Merge Request: When you add, edit, or upload a file

You can create a merge request when you add, edit, or upload a file to a repository.

1. [Add, edit, or upload] a file to the repository.
2. In the **Commit message**, enter a reason for the commit.
3. Select the **Target branch** or create a new branch by typing the name (without spaces, capital letters, or special chars).

4. Select the **Start a new merge request with these changes** checkbox or toggle. This checkbox or toggle is visible only if the target is not the same as the source branch, or if the source branch is protected.
5. Select **Commit changes**.

Task Create Merge Request: When you create a branch

You can create a merge request when you create a branch.

1. On the top bar, select **Main menu > Projects** and find your project.
2. On the left menu, select **Repository > Branches**.
3. Type a branch name and select **New branch**.
4. Above the file list, on the right side, select **Create merge request**. A merge request is created. The default branch is the target.
5. Fill out the fields and select **Create merge request**.

Task Create Merge Request: When you use Git commands locally

You can create a merge request by running Git commands on your local machine.

1. Create a branch:

   ```
   git checkout -b my-new-branch
   ```

2. Create, edit, or delete files. The stage and commit them:

   ```
   git add .
   git commit -m "My commit message"
   ```

3. Push your branch to GitLab:

   ```
   git push origin my-new-branch
   ```

   GitLab prompts you with a direct link for creating a merge request:

   ```
   ...
   remote: To create a merge request for my-new-branch, visit:
   remote:   https://gitlab.com/YOUR_USERNAME/my-project/merge_requests/new?
   merge_request%5Bsource_branch%5D=my-new-branch
   ```

4. Copy the link and paste it in your browser.

Task: Managing Merge Conflicts

Merge conflicts happen when the two branches in a merge request (the source and target) each have different changes, and you must decide which change to accept. In a merge request, Git compares the two versions of the files line by line. In most cases, GitLab can merge changes together. However, if two branches both change the same lines, GitLab blocks the merge, and you must choose which change you want to keep.

Conflicts you can resolve in the user interface

If your merge conflict meets all of the following conditions, you can resolve the merge conflict in the GitLab user interface:

- The file is text, not binary.
- The file is in a UTF-8 compatible encoding.

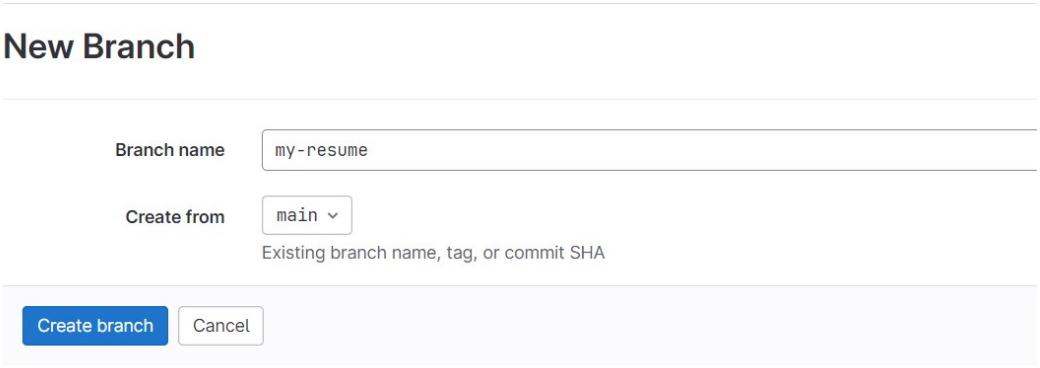
- The file does not already contain conflict markers.
- The file, with conflict markers added, is less than 200 KB in size.
- The file exists under the same path in both branches.

If any file in your merge request contains conflicts, but can't meet all of these criteria, you must resolve the conflict manually.

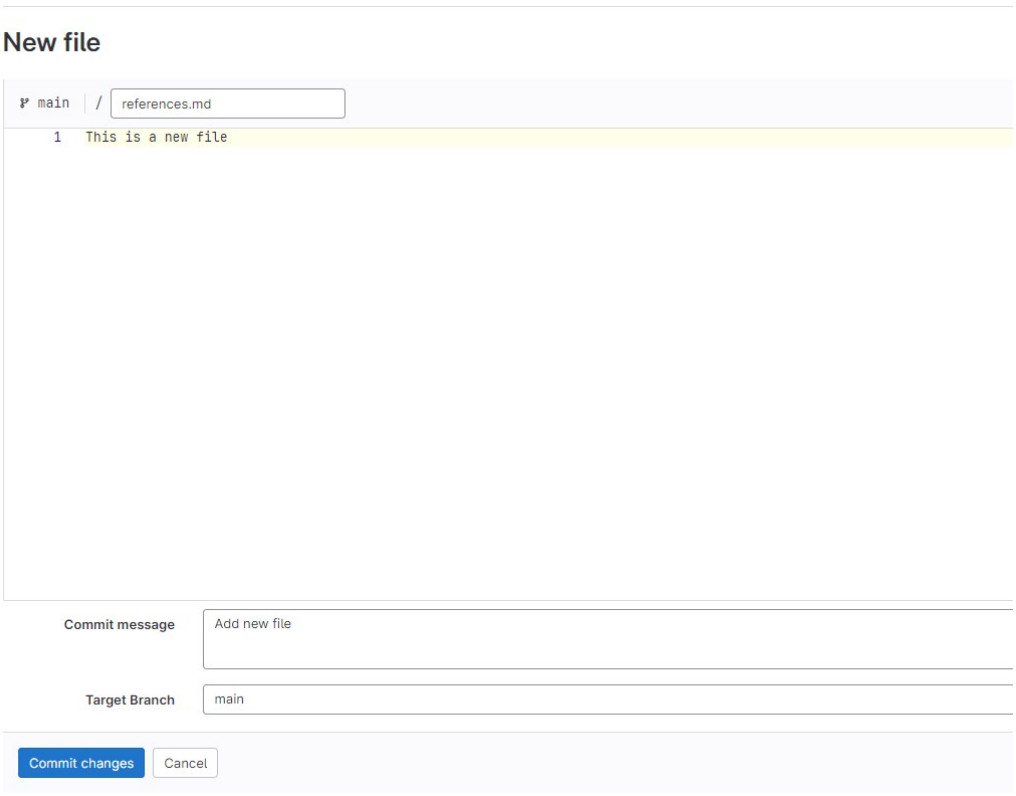
Note: Create blank new repository `merge-conflict-lab` before starting this lab.

Activity: Create your own conflict

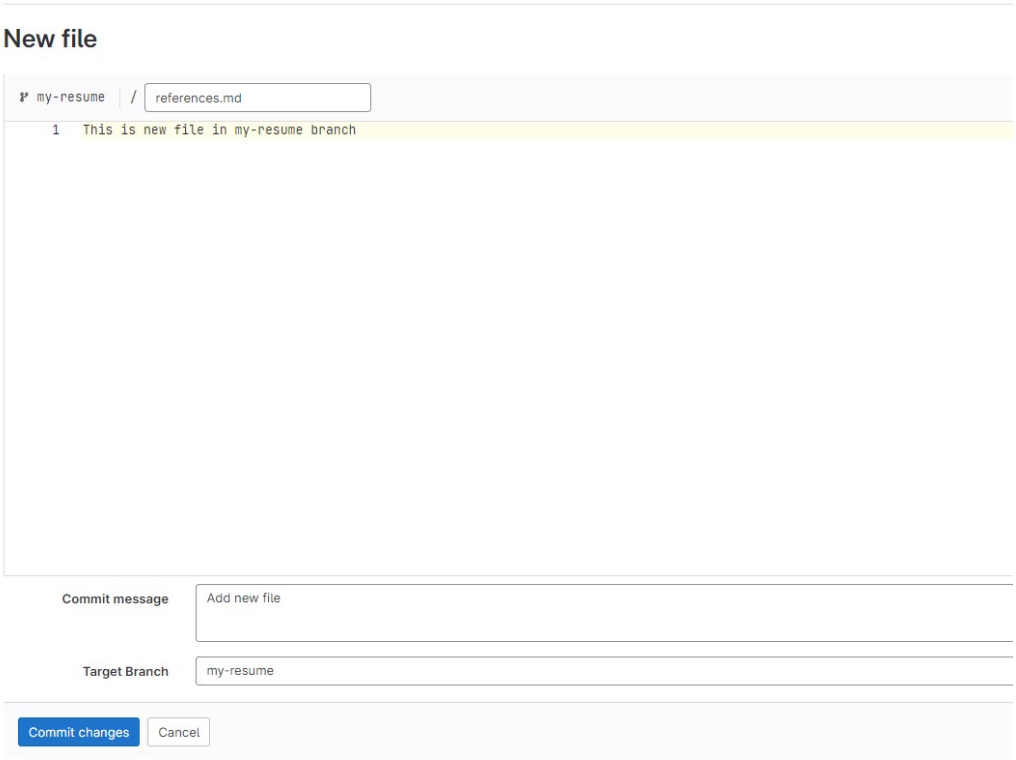
1. Create new branch `my-resume` from `main` branch.



2. Select `main` branch and create a new file called `references.md`, add some text and push that change to `main`, without updating your `my-resume` branch.



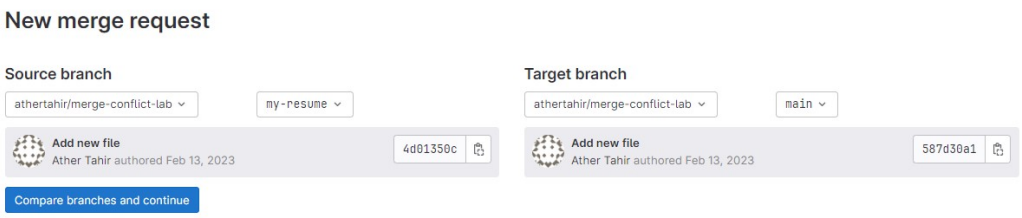
3. Browse to the `my-resume` branch.
4. Click the dropdown menu and then on `New file`.
5. Create a file named `references.md`.
6. Enter some text that conflicts with what we added for `references.md` in the `main` branch.



7. Scroll to the bottom of the page and enter a commit message for your change.
8. Click the **Commit Changes** button.

Activity: Create Merge Request

1. On the top bar, select **Main menu** > **Projects** and find your project.
2. On the left sidebar, select **Merge requests** and create the merge request.



Methods of resolving conflicts

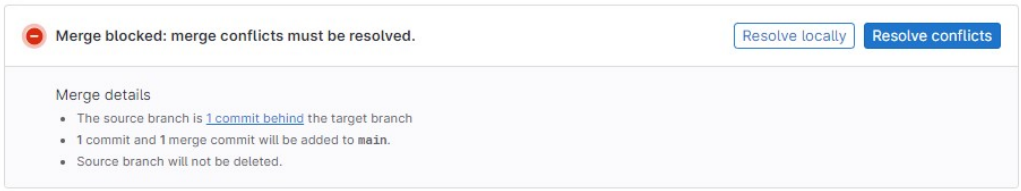
GitLab shows conflicts available for resolution in the user interface, and you can also resolve conflicts locally through the command line:

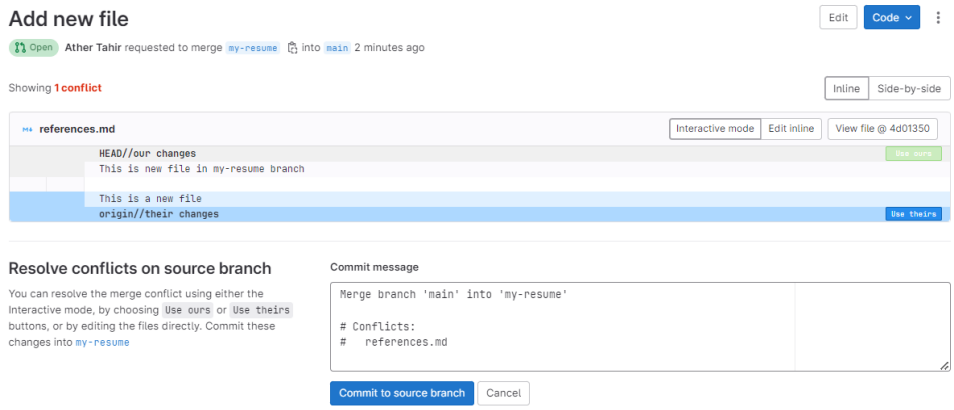
- `Interactive mode` : UI method best for conflicts that only require you to select which version of a line to keep, without edits.
- `Inline editor` : UI method best for more complex conflicts that require you to edit lines and manually blend changes together.
- `Command line` : provides complete control over the most complex conflicts.

Resolve conflicts in interactive mode

To resolve less-complex conflicts from the GitLab user interface:

1. On the top bar, select **Main menu > Projects** and find your project.
2. On the left sidebar, select **Merge requests** and find the merge request.
3. Select **Overview**, and scroll to the merge request reports section.
4. Find the merge conflicts message, and select **Resolve conflicts**. GitLab shows a list of files with merge conflicts. The conflicts are highlighted:



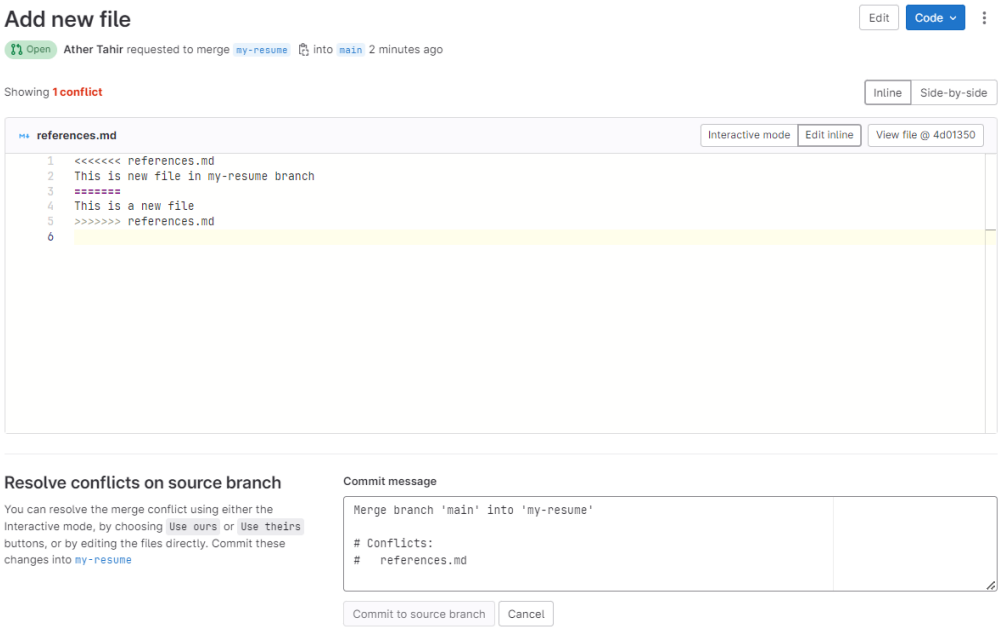


5. For each conflict, select **Use ours** or **Use theirs** to mark the version of the conflicted lines you want to keep. This decision is known as "resolving the conflict."
6. Enter a **Commit message**.
7. **Note:** You can select **Commit to source branch** to resolve conflict but let's explore another option in the next step first.

Resolve conflicts in the inline editor

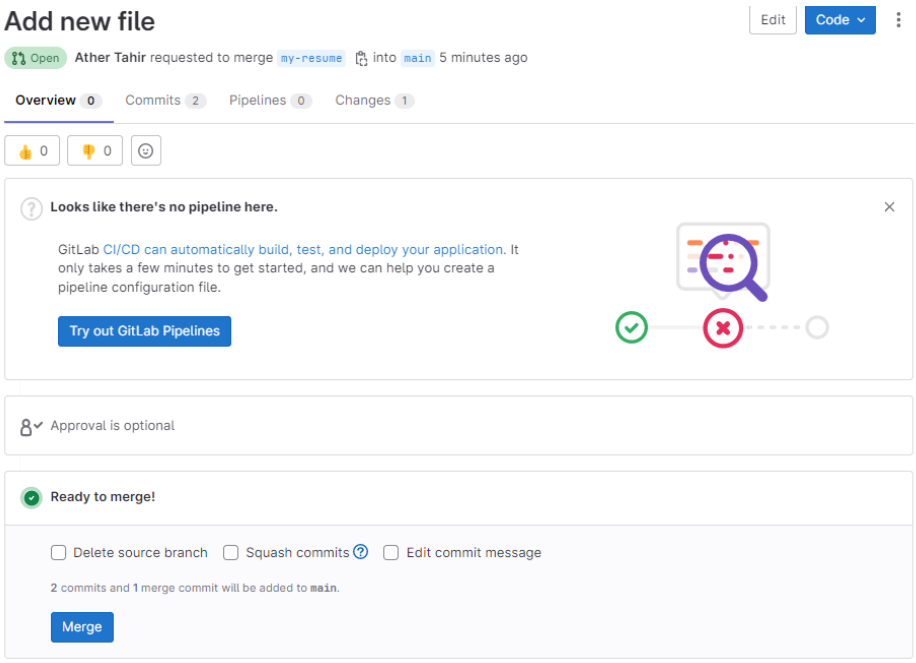
Some merge conflicts are more complex, requiring you to manually modify lines to resolve their conflicts. Use the merge conflict resolution editor to resolve complex conflicts in the GitLab interface:

1. On the top bar, select **Main menu > Projects** and find your project.
2. On the left sidebar, select **Merge requests** and find the merge request.
3. Select **Overview**, and scroll to the merge request reports section.
4. Find the merge conflicts message, and select **Resolve conflicts**. GitLab shows a list of files with merge conflicts.
5. Select **Edit inline** to open the editor:



6. After you resolve the conflict, enter a **Commit message**.
7. Select **Commit to source branch**.

8. After resolving the conflict(s), `Merge Request` is ready for merge:



Resolve Merge Conflict Locally

In this section, we will work on resolving merge conflicts.

Creating a merge conflict

Here, we will show you a simulation of how merge conflicts appear.

```
cd ~/Desktop
mkdir test-dir
cd test-dir
git init .
echo "some content" > example.txt
git add example.txt
git commit -am "initial commit"

[master (root-commit) a45c22d] initial commit
1 file changed, 1 insertion(+)
create mode 100524 example.txt
```

In the given example, we create a **test-dir** new directory. Next, we create **example.txt** text file with some content and add it to the repository and commit it. As a result, we have a new repository with one master branch and **example.txt** file. The next step is creating another branch to use as a conflicting merge.

```
git checkout -b branch_to_merge
echo "completely different content to merge later" > example.txt
git commit -am "edit the content of example.txt to make a conflict"

[branch_to_merge 4221135] edit the content of example.txt to make a conflict
1 file changed, 1 insertion(+), 1 deletion(-)
```

In the above example, we create and check out **branch_to_merge** branch. After creating, we overwrite the content in **example.txt** file and commit the new content. After doing all this, the commit overrides the content of **example.txt:**

```
git checkout master
Switched to branch 'master'
echo "content to add" >> example.txt
git commit -am "added content to example.txt"
[master 11ab34b] added content to example.txt
1 file changed, 1 insertion(+)
```

This bunch of commands checks out the master branch attaching the content to **example.txt** and committing it. So, our repository is put to the state where we have one commit in the master branch and one in the **branch_to_merge** branch. The final step is to execute the [git merge]{.kbd .highlighted} command after which conflict will occur:

```
git merge branch_to_merge
Auto-merging example.txt
CONFLICT (content): Merge conflict in example.txt
Automatic merge failed; fix conflicts and then commit the result.
```

Identifying merge conflicts

As we have already seen, Git displays output which indicates that a conflict has appeared. Execute the `git status` command to see the unmerged paths:

```
git status
On branch master
You have unmerged paths.
(fix conflicts and run "git commit")
(use "git merge --abort" to abort the merge)
Unmerged paths:
(use "git add <file>..." to mark resolution)
both modified:   example.txt
```

The example.txt file appears in a modified state. Execute **cat** command to put out the contents of the example.txt file. We can see these visual marks:

```
<<<<<<< HEAD
=======
>>>>>>> branch_to_merge
```

The **=======** marks is the center of the conflict. The content between the center and the HEAD line is the content existing in the current branch master that the HEAD reference is pointing to. Read more about visual marks on the [git merge]{.kbd .highlighted} page.

Resolving merge conflicts

To resolve a merge conflict you should edit the conflicted file. Open the **example.txt** file in the editor and remove all the marks. The changed file has the following look:

```
some content to mess with
content to add
completely different content to merge later
```

Execute the `git add` command to stage the new merge content. Next, create a new commit to complete the merge:

```
git add .
git commit -m "the conflict in example.txt is merged and resolved"
```