Lesson-End Project

Implementing Advance Operations in Git

Project agenda: To execute advanced Git operations for enhanced version control and collaboration

Description: Imagine you are a software developer who has been asked to work on the Codex repository on GitHub. The goal is to solve issues using Git. First, create the Codex repo. Then, perform key Git tasks like tagging and branching. Understand Git rebase versus Git revert, explore Git log, and use Git rm with Git status. This project aims to improve teamwork and issue tracking for the Codex repository.

Tools required: Git and GitHub

Prerequisites: You must have Git installed in the lab to proceed.

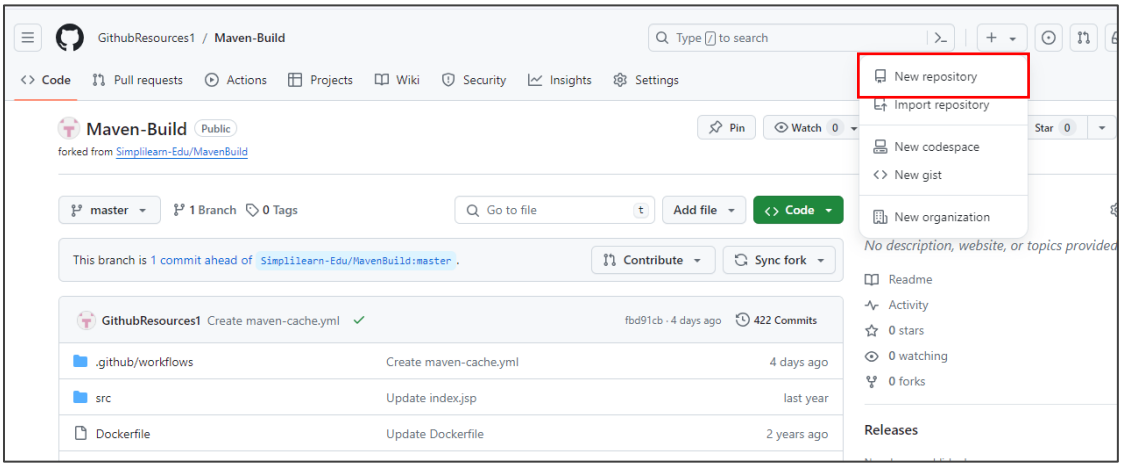
Expected deliverables: Creation of a GitHub repository named Codex with specified operations executed

Steps to be followed:

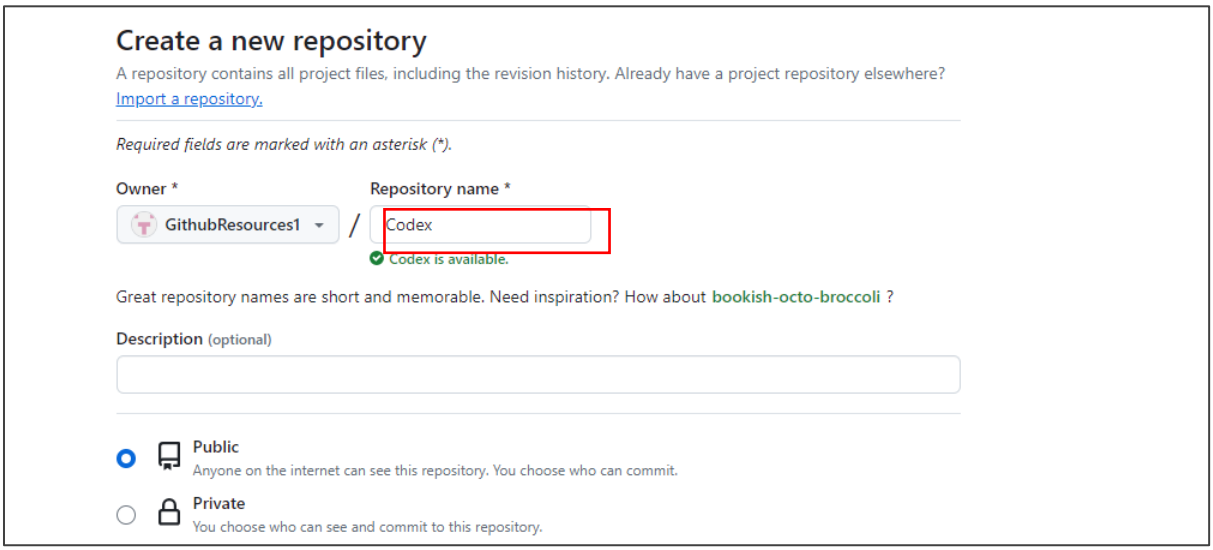
1. Create a new repository in Git
2. Create a tag in Git
3. Create a new branch in Git
4. Revert to the previous commit
5. Rebase the branch to integrate the changes
6. Remove the files from the Git index

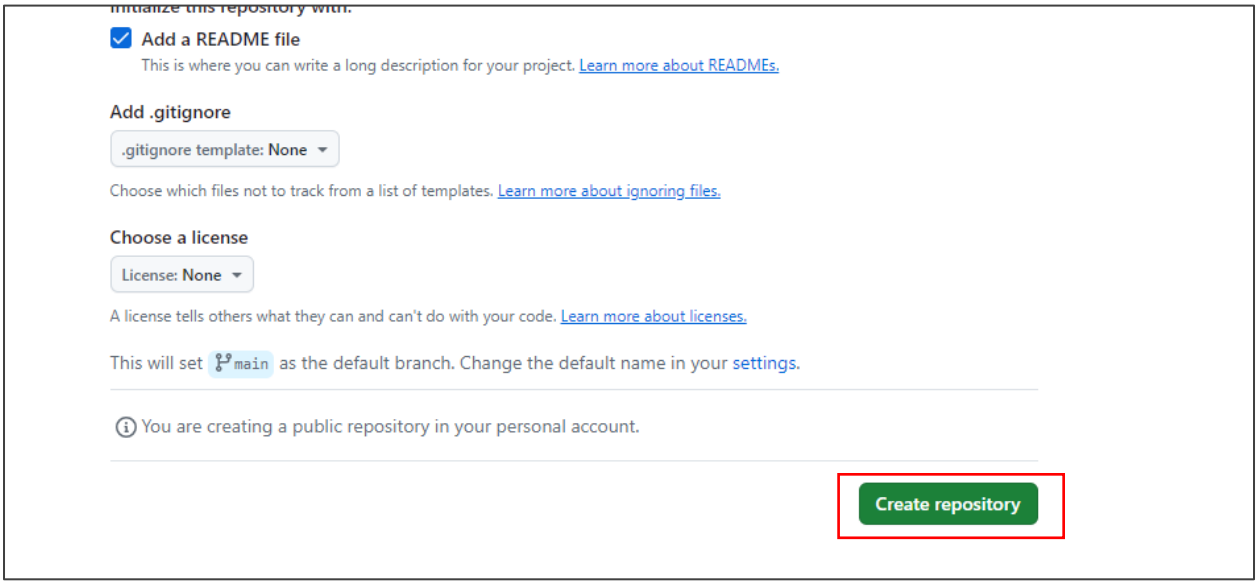
Step 1: Create a new repository in Git

1.1 Click on the **+** icon in the upper-right corner of the page and select **New repository** from the drop-down menu



1.2 Provide the **Repository name** as **Codex**, select the **Add a README file**, choose **Public** for the repository type, and click on **Create repository**



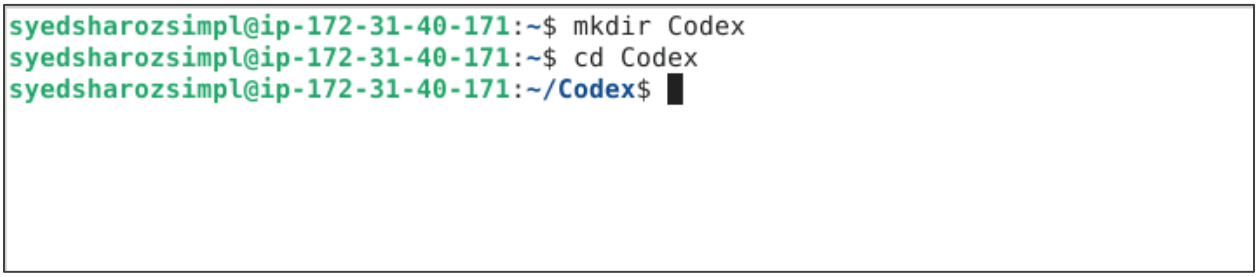


Step 2: Create a tag in Git

2.1 Open the terminal tab and execute the following command to create and navigate into the **Codex** project directory:

mkdir Codex

cd Codex



2.2 Execute the following command to clone the repository:

git clone “repo path”

cd “repo name”

```
syedsharozsimpl@ip-172-31-40-171:~/Codex$ git clone https://github.com/GithubRes
ources1/Codex.git
Cloning into 'Codex'...
remote: Enumerating objects: 4, done.
remote: Counting objects: 100% (4/4), done.
remote: Compressing objects: 100% (2/2), done.
Receiving objects: 100% (4/4), done.
remote: Total 4 (delta 0), reused 1 (delta 0), pack-reused 0
syedsharozsimpl@ip-172-31-40-171:~/Codex$ cd Codex
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

2.3 Execute the following command to create a new file:

touch testfile1

```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ touch testfile1
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

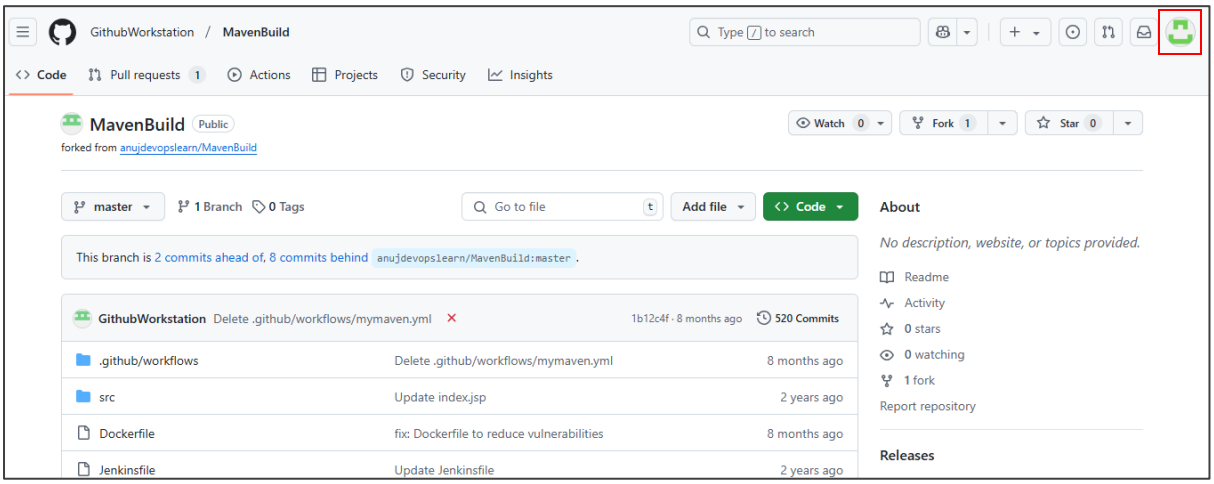
2.4 Execute the following command to commit the changes and create a tag in Git:

git commit -m "soruce ver 1.0"

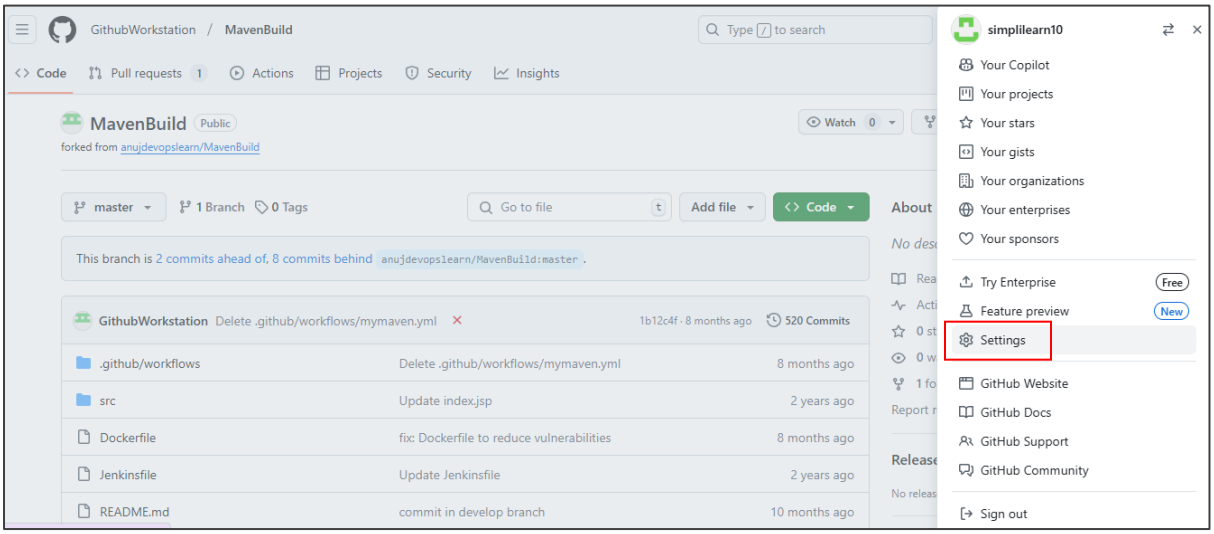
git tag -a 1.0 -m"version 1.0"

```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git commit -m "soruce ver 1.0"
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        testfile1

nothing added to commit but untracked files present (use "git add" to track)
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git tag -a 1.0 -m"version 1.0"
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

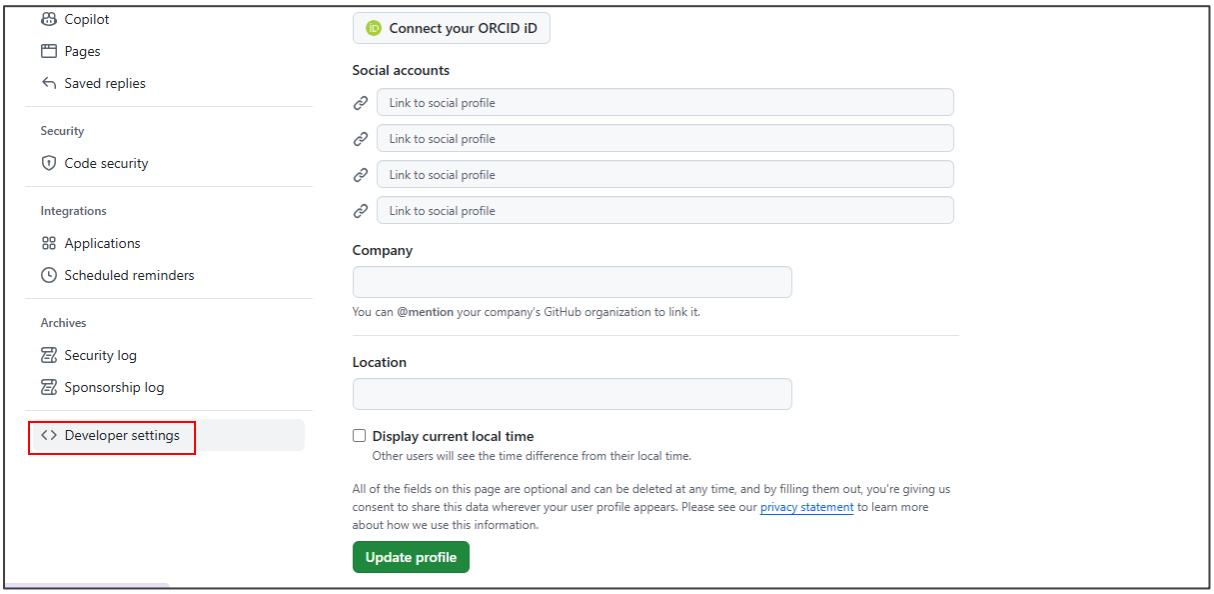
2.5 Navigate back to your github account and click on your profile in the top right corner



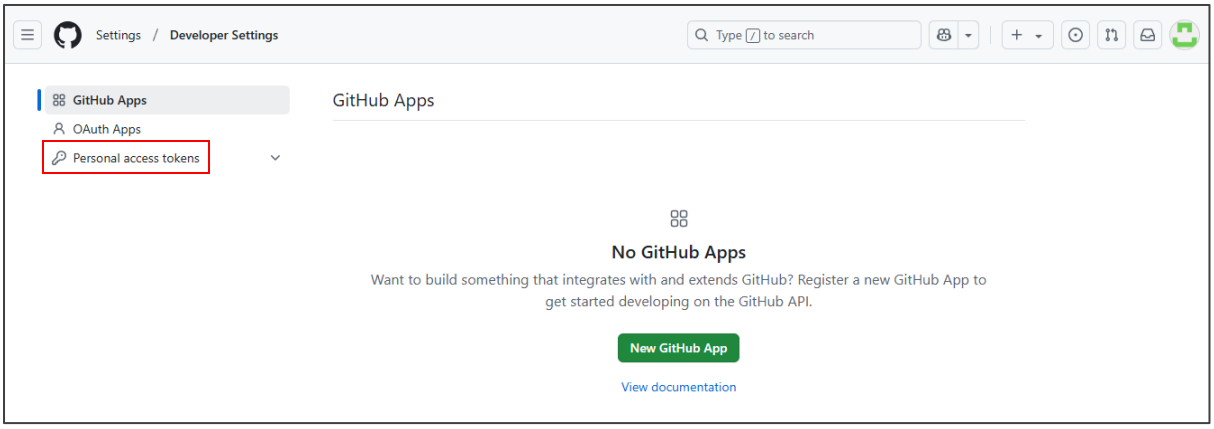
2.6 Click **Setting**



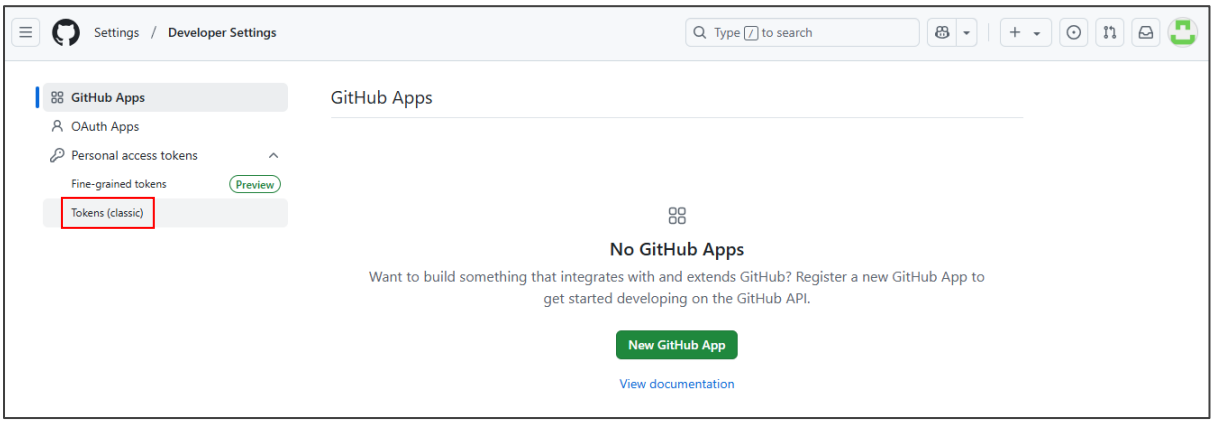
2.7 Click **Developer settings**



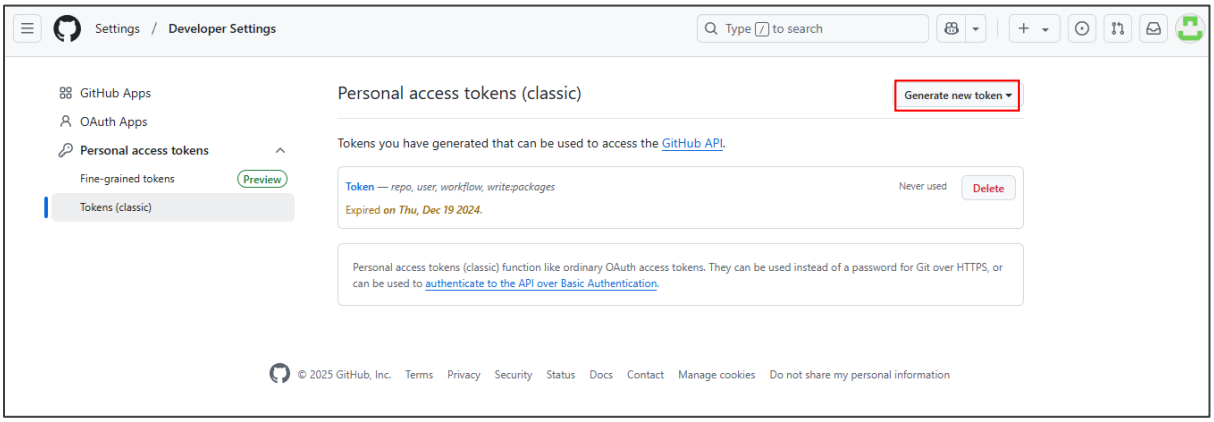
2.8 Click **Personal access tokens**



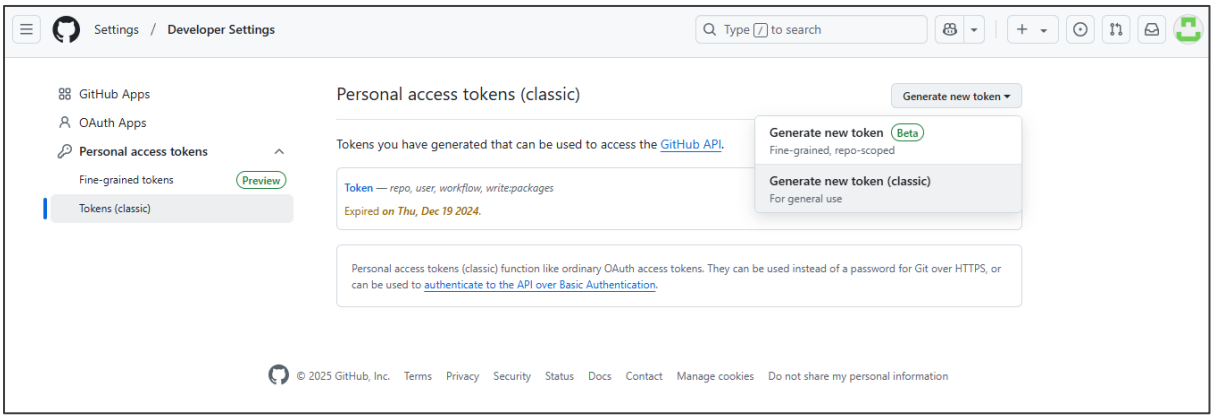
2.9 Click **Tokens (classic)**



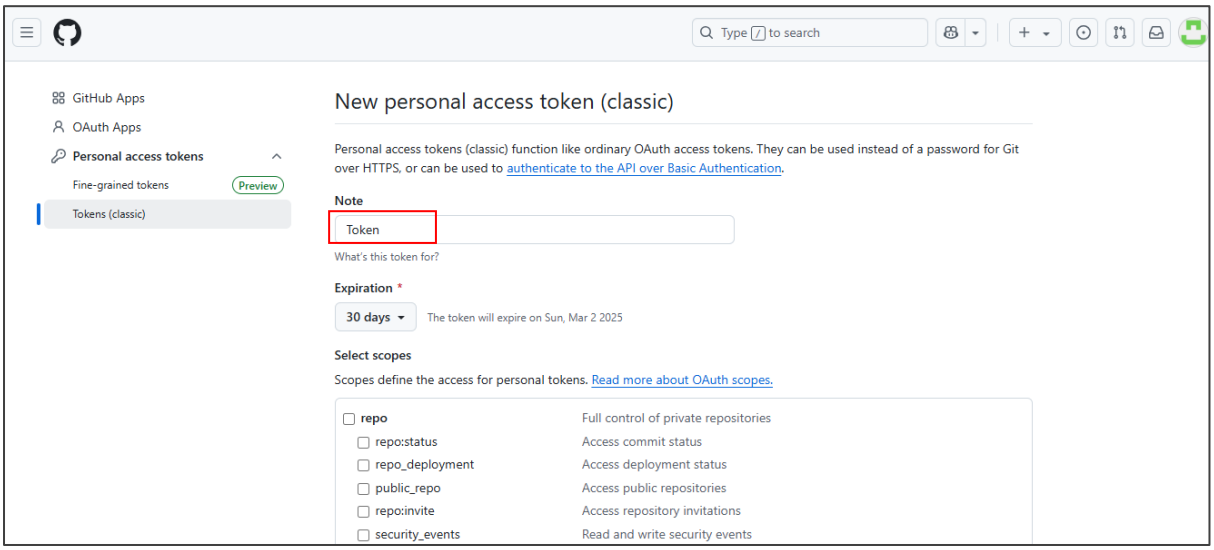
2.10 Click **Generate new token**



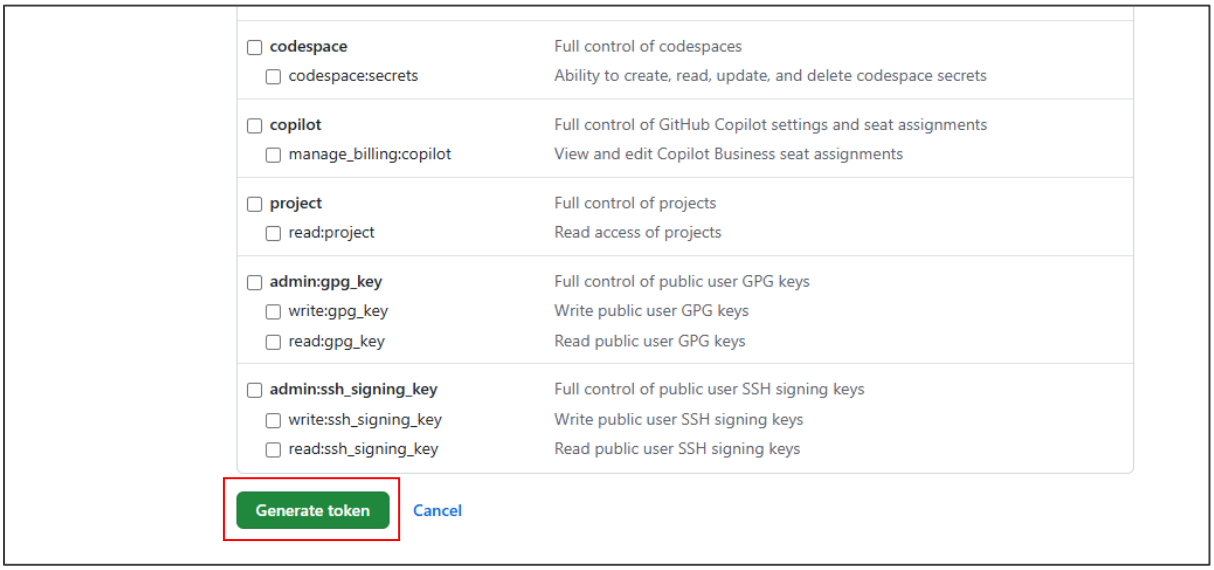
2.11 Click **Generate new token (classic)**



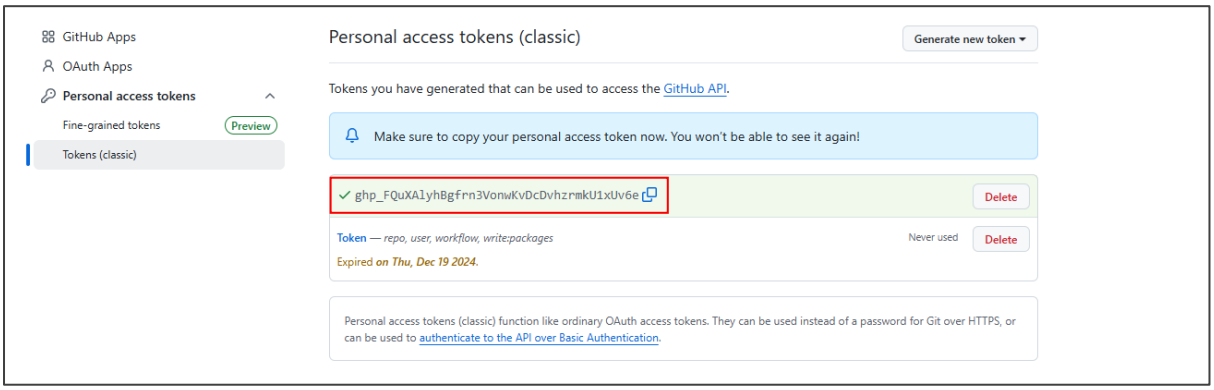
2.12 Provide a name to the token



2.13 Scroll down and click **Generate token**



2.14 Copy the token

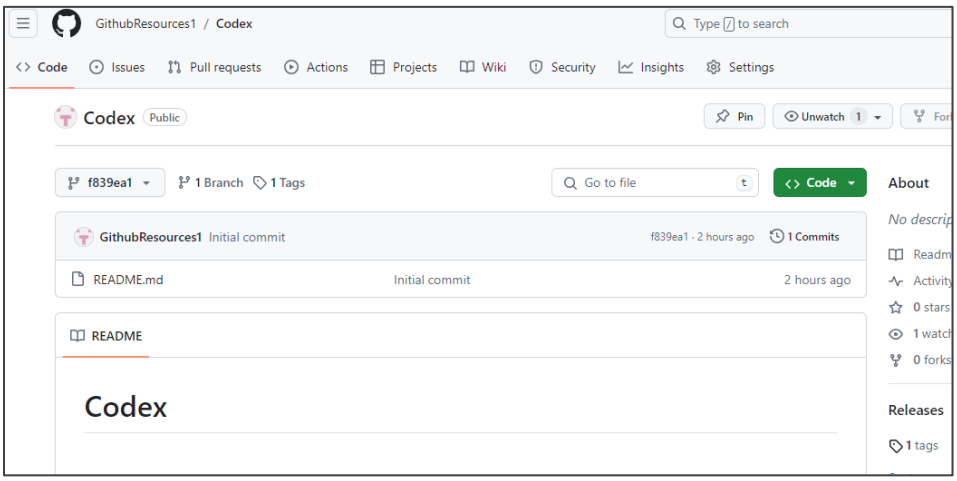


2.15 Navigate back to your terminal and execute the following command to push a tag: **git push origin "tag name"**

```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git push origin 1.0
Username for 'https://github.com': GithubResources1
Password for 'https://GithubResources1@github.com':
Enumerating objects: 1, done.
Counting objects: 100% (1/1), done.
Writing objects: 100% (1/1), 159 bytes | 159.00 KiB/s, done.
Total 1 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/GithubResources1/Codex.git
 * [new tag]         1.0 -> 1.0
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

Note: Enter your GitHub account name as the username, and paste the token copied in Step 2.14 as the password.

2.16 Navigate back to your GitHub repository to check the tag



You can see the tag has been pushed.

Step 3: Create a new branch in Git

3.1 Open the terminal tab and execute the following command to create and switch to a new branch:

git branch "branch name"

git checkout "branch name"

```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git branch engineering
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git checkout engineering
Switched to branch 'engineering'
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

3.2 Execute the following commands to create and add a file in the **engineering** branch:

touch file1

git add .

```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ touch file1
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git add .
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

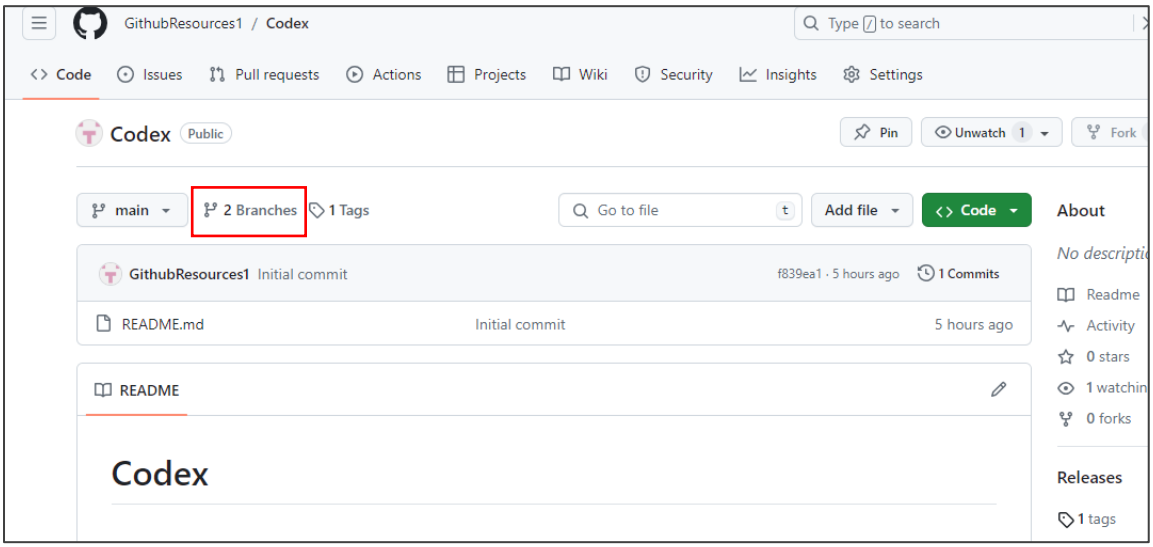
3.3 Execute the following command to commit the changes:
git commit -m “added files”

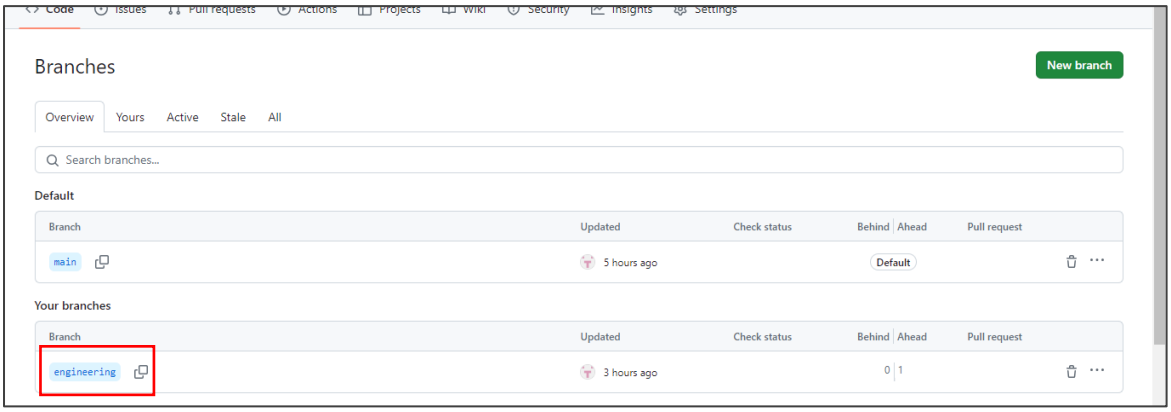
```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git commit -m "added files"
[engineering 6758793] added files
 2 files changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 file1
 create mode 100644 testfile1
```

3.4 Execute the following command to push the changes to the remote repository:
git push origin “new branch name”

```
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$ git push origin engineering
Username for 'https://github.com': GithubResources1
Password for 'https://GithubResources1@github.com':
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 4 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 279 bytes | 279.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
remote:
remote: Create a pull request for 'engineering' on GitHub by visiting:
remote:      https://github.com/GithubResources1/Codex/pull/new/engineering
remote:
To https://github.com/GithubResources1/Codex.git
 * [new branch]      engineering -> engineering
syedsharozsimpl@ip-172-31-40-171:~/Codex/Codex$
```

3.5 Navigate to the **Codex** repository in GitHub, and click on **Branches** to verify whether the branch has been pushed or not





You can see that a new branch is created.

Step 4: Revert to the previous commit

4.1 Use the command given below to create and switch to a new branch:

git checkout -b test-branch

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git checkout -b test-branch
Switched to a new branch 'test-branch'
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.2 Execute the following commands to create a new file and modify it:

touch example.txt

echo "Hello, this is an example file." > example.txt

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ touch example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ echo "Hello, this is an example file." > example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.3 Run the following commands to add and commit the changes:

git add example.txt

git commit -m "Add example file"

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git add example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git commit -m "Add example file"
[test-branch 0691c04] Add example file
 1 file changed, 1 insertion(+)
 create mode 100644 example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.4 Run the following command to push the changes to the **test-branch** of the remote repository:

git push origin test-branch

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git push origin test-branch
Username for 'https://github.com': GithubResources1
Password for 'https://GithubResources1@github.com':
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 4 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 353 bytes | 353.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
remote:
remote: Create a pull request for 'test-branch' on GitHub by visiting:
remote:      https://github.com/GithubResources1/Codex/pull/new/test-branch
remote:
To https://github.com/GithubResources1/Codex.git
 * [new branch]      test-branch -> test-branch
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.5 Run the following commands to modify the **example.txt** file further:

touch example.txt

echo "Hello world" > example.txt

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ touch example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ echo "Hello world" > example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.6 Run the following commands to add and commit the changes:

git add example.txt

git commit -m "Modify example file"

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git add example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git commit -m "Modify example file"
[test-branch 3982012] Modify example file
 1 file changed, 1 insertion(+), 1 deletion(-)
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.7 Execute the following command to inspect the commit history and identify the commit for reversal:

git log --oneline

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git log --oneline
3982012 (HEAD -> test-branch) Modify example file
0691c04 (origin/test-branch) Add example file
6758793 (origin/engineering, feature-branch, engineering) added files
f839ea1 (tag: 1.0, origin/main, origin/HEAD) Initial commit
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.8 Run the given command to revert to the preceding commit:

git reset HEAD ~1

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git reset HEAD~1
Unstaged changes after reset:
M       example.txt
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

4.9 Run the provided command to verify the commit history and confirm the successful reversal:

git log --oneline

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git log --oneline
0691c04 (HEAD -> test-branch, origin/test-branch) Add example file
6758793 (origin/engineering, feature-branch, engineering) added files
f839ea1 (tag: 1.0, origin/main, origin/HEAD) Initial commit
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

Step 5: Rebase the branch to integrate the changes

5.1 Execute the below command to create and switch to a new branch:

git branch testing

git checkout testing

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git branch testing
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git checkout testing
Switched to branch 'testing'
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

5.2 Create a file, stage the changes in the current working directory, and commit the staged changes using the following commands:

touch file5

git add .

git commit -m “files added”

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ touch file5
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git add .
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git commit -m "files added"
[testing 9a65704] files added
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 file5
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

5.3 Create another file, stage the changes, and commit the staged changes using the following commands:

touch file6

git add .

git commit -m “file6 added”

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ touch file6
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git add .
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git commit -m "file6 added"
[testing 9fdf708] file6 added
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 file6
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

5.4 Run the following command to display the commit history of a repository:

git log

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git log
commit 9fdf708dc0d591447572d20472e5738fe3ba4d1c (HEAD -> testing)
Author: Gitresource <githubresource@gmail.com>
Date:   Mon Apr 22 12:32:53 2024 +0000

    file6 added

commit 9a65704307d849899c40a10d5cf070c8f4ccb08c
Author: Gitresource <githubresource@gmail.com>
Date:   Mon Apr 22 12:27:41 2024 +0000

    files added
```

5.5 Switch to the main branch using the following command:

git checkout main

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git checkout main
Switched to branch 'main'
Your branch is ahead of 'origin/main' by 3 commits.
  (use "git push" to publish your local commits)
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

5.6 List the branch that you are currently working on using the following command:

git branch

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git branch
* main
  testing
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

5.7 Create a file inside a main branch, stage the changes in the current working directory, and commit the staged changes using the following commands:

touch file7

git add .

git commit -m “file7 added”

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ touch file7
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git add .
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git commit -m "file7 added"
[main 301f7c1] file7 added
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 file7
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

5.8 Run the following command to display the commit history of a repository:

git log

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git log
commit 301f7c1b182809f60ed971cce73816f76a58fefd (HEAD -> main)
Author: Gitresource <githubresource@gmail.com>
Date:   Mon Apr 22 12:47:09 2024 +0000

    file7 added
```

5.9 Run the following commands to rebase both the branches and check the commit history of a repository after rebasing:

git rebase testing main

git log

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git rebase testing main
Successfully rebased and updated refs/heads/main.
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git log
commit 1a6e629df5f9357e87266eacb12d35000d815606 (HEAD -> main)
Author: Gitresource <githubresource@gmail.com>
Date:   Mon Apr 22 12:47:09 2024 +0000

    file7 added

commit 9fdf708dc0d591447572d20472e5738fe3ba4d1c (testing)
Author: Gitresource <githubresource@gmail.com>
Date:   Mon Apr 22 12:32:53 2024 +0000

    file6 added

commit 9a65704307d849899c40a10d5cf070c8f4ccb08c
Author: Gitresource <githubresource@gmail.com>
Date:   Mon Apr 22 12:27:41 2024 +0000

    files added
```

Step 6: Remove the files from the Git index

6.1 Execute the following command to list all the files in the current branch:

ls

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ ls
file5  file6  file7
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

6.2 Execute the following commands to remove **file5** in the current branch and check the status:

git rm file5

ls

git status

```
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git rm file5
rm 'file5'
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ ls
file6  file7
ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$ git status
On branch main
Your branch is ahead of 'origin/main' by 6 commits.
  (use "git push" to publish your local commits)

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        deleted:    file5

ravitulsianisim@ip-172-31-31-214:~/Codex/Codex$
```

You can see that **file5** has been removed.

By following these steps, you have successfully implemented advanced Git operations to enhance version control and collaboration.