



Getting started with Git

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In this train, we'll delve deeper into the practical aspects of using Git for version control. We'll cover the fundamental concepts, from initialising a repository to managing branches.

Learning objectives

By the end of this train, you should be able to:

- Set basic Git configurations to personalise the version control environment.
- Initialise a Git repository for a new project.
- Understand the concept of branches and demonstrate how to create, switch, and merge branches.

Outline

- [Using Git](#)
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Using Git

In many cases, we issue Git commands through our built-in terminal or the Git Bash interface (which comes included in Git for Windows).

We can start by confirming whether Git is installed on our machine using the `git version` command.

```
Last login: Tue Jan  9 06:33:27 on ttys002
(base) nyathirambuga@Maureens-MacBook-Air ~ % git version
git version 2.40.0
(base) nyathirambuga@Maureens-MacBook-Air ~ %
```

Figure 1: Check the Git version.

If Git is installed on our computer, the **Git version available will be returned**. If no version is returned, it means that Git has not yet been installed.

Note that we clear the terminal after each step before entering a new command (using the `clear` command for Mac and `cls` for Windows).

Setting up Git

a) Installing Git

If Git is not already installed, we will proceed to **download and install Git** onto our local machine.

There are different ways to install Git depending on our operating system. Go to this [link](#) and choose the operating system that you wish to download for.

Then, follow the given instructions to install Git on your system.

Type in the `git version` command on the terminal once again to verify that Git has been successfully installed.

Git configuration

Git configuration refers to the process of **personalising our version control environment**.

This way, Git is able to identify us and associate us to the commits that we make. This is helpful when it comes to identifying and tracking contributors in a collaborative project.

We can add user information such as the username and email (you can use the same credentials as your GitHub account) using the `config` command:

- Configure user name: `git config --global user.name "Your Name"`
- Configure user email: `git config --global user.email "your.email@example.com"`
- The `git config --global --list` gives us a view of the current configuration.

```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air ~ % git config --global user.name "maureen-explore"
[(base) nyathirambuga@Maureens-MacBook-Air ~ % git config --global user.email "maureen@explore.ai"
"
[(base) nyathirambuga@Maureens-MacBook-Air ~ % git config --global --list
filter.lfs.process=git-lfs filter-process
filter.lfs.required=true
filter.lfs.clean=git-lfs clean -- %f
filter.lfs.smudge=git-lfs smudge -- %f
user.name=maureen-explore
user.email=maureen@explore.ai
(base) nyathirambuga@Maureens-MacBook-Air ~ % ]
```

Figure 2: Configure Git.

Note: We use `global` to indicate that we want to set the username and email **forever repository on our computer**. Otherwise, we can remove it if we want to set the username and email only for the current repo.

Initialise a Git repository for a new project

a) Create the project folder

We start by **creating a new folder** where we will store our new project. You can also choose to work on an already existing folder.

We then **navigate** to the newly created/existing project folder on our terminal using the `cd` command.

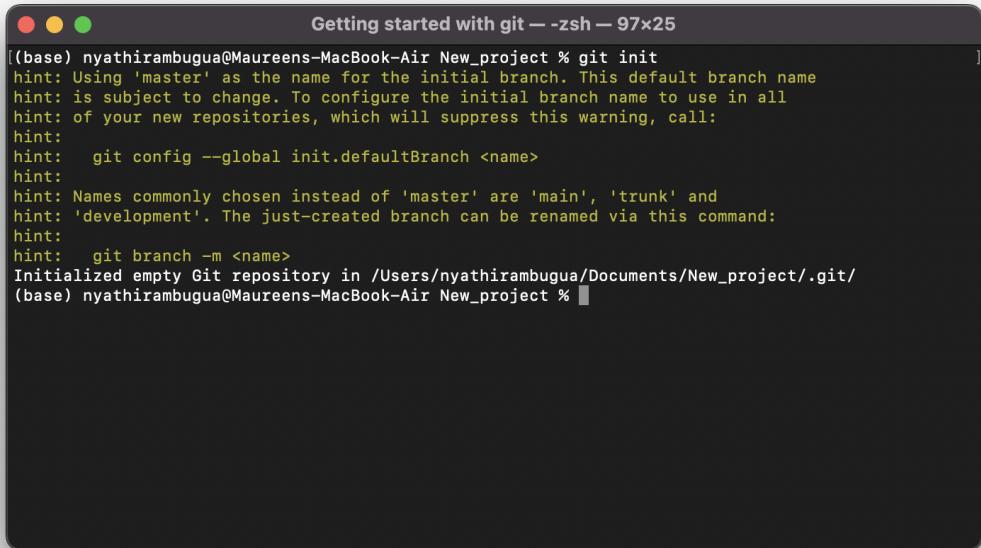
```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air ~ % cd /Users/nyathirambuga/Documents/New_project
[(base) nyathirambuga@Maureens-MacBook-Air New_project % ]
```

Figure 3: Navigate to the project folder.

Alternatively, if you are using Windows, you can open the folder in your file explorer then right-click on it and select **Git Bash Here**.

b) Initialise Git on the project folder

Once we are in the correct folder, we can **initialise Git on that folder** using the `git init` command.



```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git init
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint:   git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint:   git branch -m <name>
Initialized empty Git repository in /Users/nyathirambuga/Documents/New_project/.git/
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 4: Initialise Git.

A new Git repository has now been created. Git will now track the New_project folder.

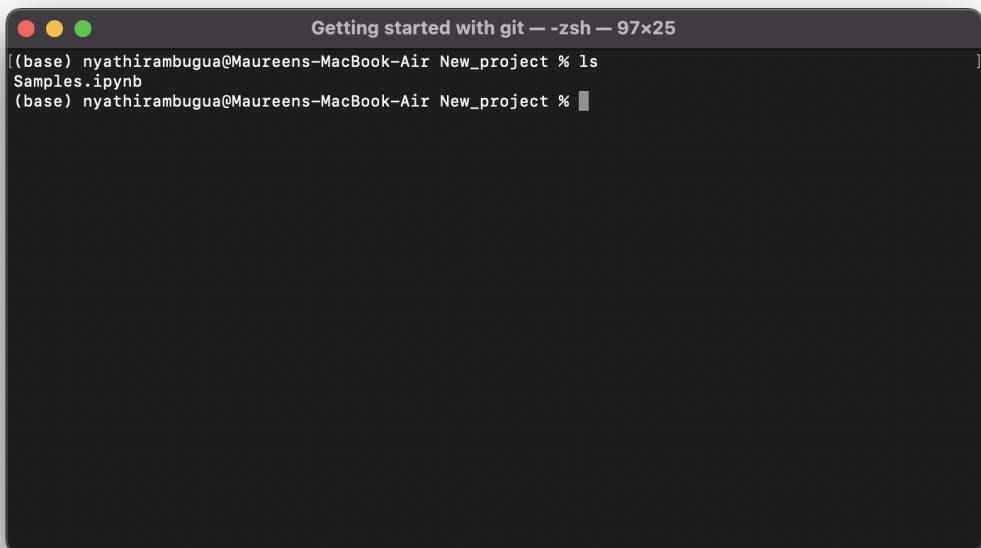
Adding new files to the Git repository folder

With our local Git repository set up, we can now **add files to our project**

a) Add a file to the project folder

Say we have created a notebook file named Samples.ipynb and we want it to be part of our newly created repo. We will now save this file in the project folder we created earlier.

Let's use the ls command to list the files available in our working directory (i.e. My_project).



```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % ls
Samples.ipynb
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 5: List files in the working directory.

We can see that Samples.ipynb is there.

Files in a Git repository folder can have either one of the following statuses:

- **Untracked:** Files that are present in the project directory but have not yet been added to the Git repository for monitoring.
- **Tracked:** Files that have been added to the Git repository and are being monitored for changes.

Let's use the git status command to confirm whether the new file, Samples.ipynb, is part of our repo.

```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .DS_Store
    .ipynb_checkpoints/
  Samples.ipynb

nothing added to commit but untracked files present (use "git add" to track)
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 6: Check the new file status.

When we first **add new files** to a Git repository folder, they are **by default untracked**, which is the case for `Samples.ipynb` above. We have to explicitly add the new file to the Git repository for it to be included in the version history.

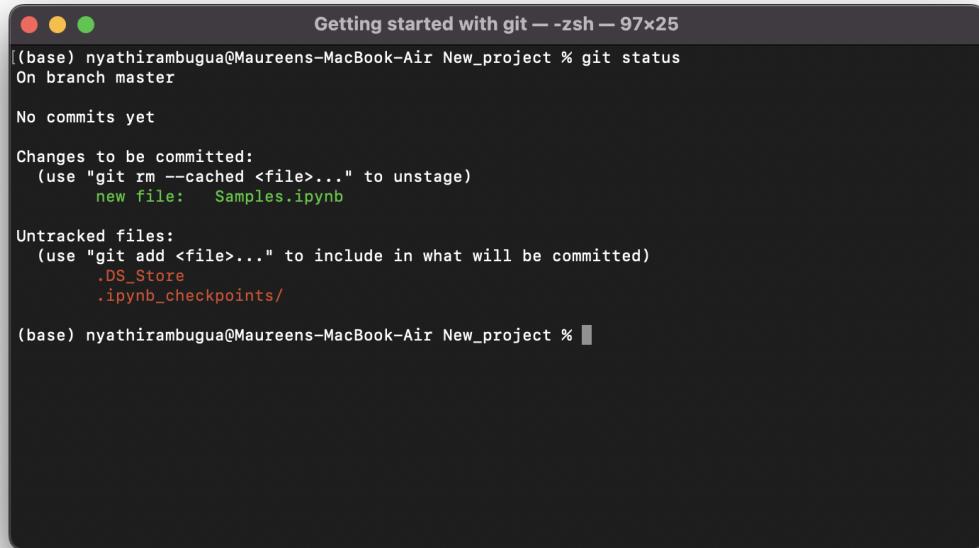
b) Add the new file to the staged environment

For our file to be tracked, we will **add it to the staged environment** using the `git add` command. When we stage a file, we are ready to commit it to our repository.

```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git add Samples.ipynb
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 7: Add a new file to the repo.

Let's confirm the status of our `Samples.ipynb` file.



```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   Samples.ipynb

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .DS_Store
    .ipynb_checkpoints/
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 8: Confirm the status of the new file.

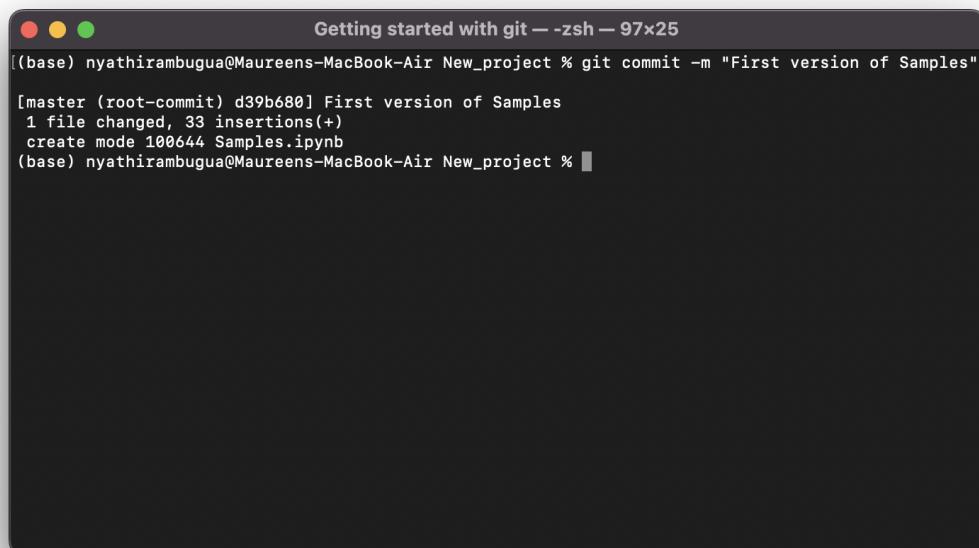
We can see that the file has now been staged.

Note: If we have more than one file, we use `git add .` or `git add --all` instead of individual file names to stage all of them:

- `git add .`: Stages new and modified files only in the current directory and its subdirectories.
- `git add --all`: Stages all changes (new, modified, and deleted files) across the entire repository.

Committing

We use the `commit` command to **commit all the changes that are in the staging area** to the current repository. This can also be accompanied by a commit message `-m "message"`.



```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git commit -m "First version of Samples"
[master (root-commit) d39b680] First version of Samples
 1 file changed, 33 insertions(+)
  create mode 100644 Samples.ipynb
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 9: Commit staged changes.

We can use the `git log` command to **view all the commits** that have been made to a particular repository.

```
Getting started with git -- -zsh -- 97x25
[(base)] nyathirambuga@Maureens-MacBook-Air New_project % git log
commit d39b680a563339d0901f6d2d86348d67ab7effbb (HEAD -> master)
Author: maureen-explore <maureen@explore.ai>
Date:   Tue Jan 9 08:23:04 2024 +0300

    First version of Samples
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 10: View all commits.

Branching

Suppose we want to update the `Samples.ipynb` file without interfering with the initial version. We will **create a branch** to isolate these changes, which we can later merge into the main branch.

a) Creating a branch

We use the `git branch` command, followed by the branch name to create a new branch.

```
Getting started with git -- -zsh -- 97x25
[(base)] nyathirambuga@Maureens-MacBook-Air New_project % git branch sample-update
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 11: Create a new branch.

We can confirm that our branch has been successfully created by listing all the branches:

```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git branch
* master
  sample-update
(base) nyathirambuga@Maureens-MacBook-Air New_project % ]
```

Figure 12: List all branches.

We can see the new branch, `sample-update`, that we have just created. However, we are still currently in the `master` branch, as shown by the next to it.

b) Switching to a branch

We will switch to the `newsample-update` branch using the `checkout` command.

```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git checkout sample-update
Switched to branch 'sample-update'
(base) nyathirambuga@Maureens-MacBook-Air New_project % ]
```

Figure 13: Switch to a new branch.

While in the new branch, we make the desired changes to the `samples.ipynb` file. We also add a new file, `Country.csv`, containing a dataset.

Now, let's check the status of the current branch:

```
Getting started with git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git status
On branch sample-update
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   Samples.ipynb

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .DS_Store
    .ipynb_checkpoints/
    Country.csv

no changes added to commit (use "git add" and/or "git commit -a")
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 14: Check the status of the current branch.

We observe that:

- We have changes in the Samples.ipynb file that have not been staged for commit.
- We have a new file Country.csv that is untracked.

We therefore go ahead and **add the two files to the staging environment**. We will then **commit our changes to the current feature branch**.

```
Getting_started_with_Git — -zsh — 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git commit -m "Second version of Samples"
"
[sample-update cff6602] Second version of Samples
 4 files changed, 385 insertions(+), 1 deletion(-)
  create mode 100644 .DS_Store
  create mode 100644 .ipynb_checkpoints/Samples-checkpoint.ipynb
  create mode 100644 Country.csv
(base) nyathirambuga@Maureens-MacBook-Air New_project %
```

Figure 15: Commit changes to the current branch.

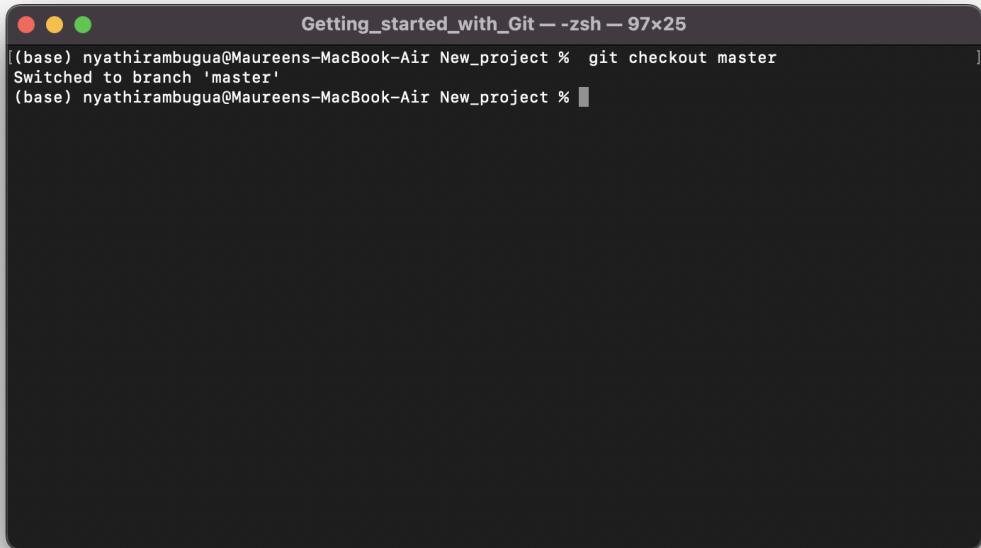
What would we find when we switch back to the main branch and list all the files in the repository?

c) Merging a branch

The changes we have just committed are available on the feature branch, but not on the main branch. That is, the updates made to the Samples.ipynb file and the addition of a new dataset file, Country.csv.

Therefore, we need to **merge the main branch and the feature branch** for the changes to also reflect on the main branch.

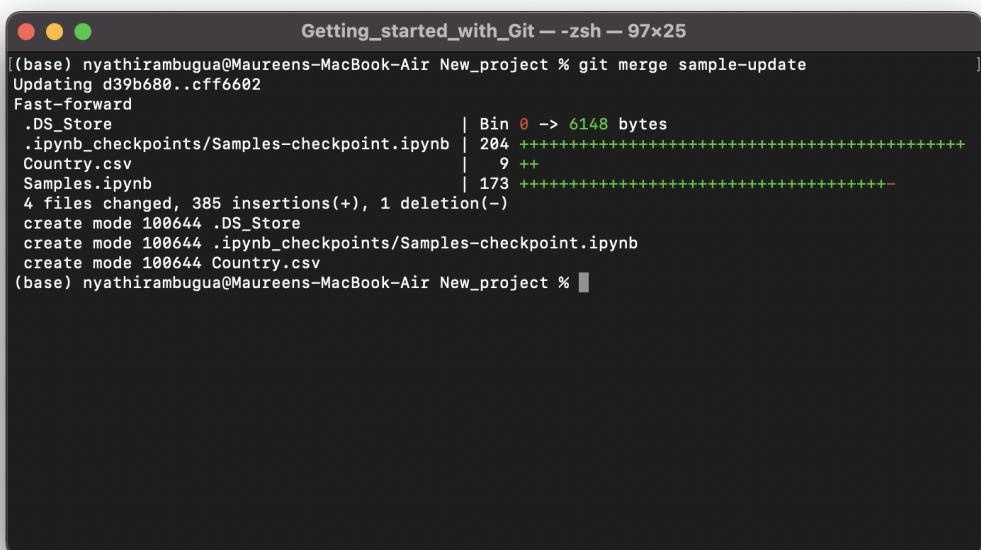
First, we need to switch to the main branch.



```
Getting_started_with_Git -- zsh -- 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git checkout master
Switched to branch 'master'
(base) nyathirambuga@Maureens-MacBook-Air New_project % ]
```

Figure 16: Switch to the main branch.

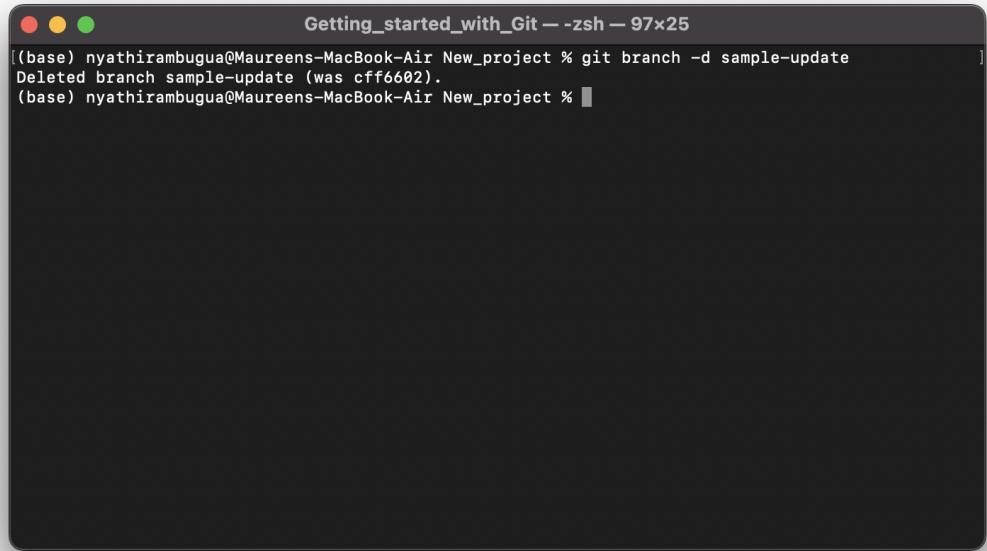
We then merge the current master branch with the sample-update branch.



```
Getting_started_with_Git -- zsh -- 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git merge sample-update
Updating d39b680..cff6602
Fast-forward
  .DS_Store                  | Bin 0 -> 6148 bytes
  .ipynb_checkpoints/Samples-checkpoint.ipynb | 204 ++++++-----+
  Country.csv                 |   9 ++
  Samples.ipynb               | 173 +-----+
4 files changed, 385 insertions(+), 1 deletion(-)
create mode 100644 .DS_Store
create mode 100644 .ipynb_checkpoints/Samples-checkpoint.ipynb
create mode 100644 Country.csv
(base) nyathirambuga@Maureens-MacBook-Air New_project % ]
```

Figure 17: Merge branches.

We can now safely delete the feature branch as we do not need it anymore.



```
Getting_started_with_Git -- zsh -- 97x25
[(base) nyathirambuga@Maureens-MacBook-Air New_project % git branch -d sample-update
Deleted branch sample-update (was cff6602).
(base) nyathirambuga@Maureens-MacBook-Air New_project % ]
```

Figure 18: Delete a branch.

