Introduction and Context

GitHub is a web-based platform for hosting Git repositories, enabling teams to track changes, review code, and manage projects collaboratively. By the end of this tutorial, you'll be able to initialize a repository, work on feature branches, record changes with commits, propose updates via pull requests, and merge them into your main code line.

Case Study Overview

Problem Statement
Alex has just joined TechStart's engineering team and must demonstrate proficiency with GitHub's core workflows. Their task is to set up a public "hello-world" repository, collaborate with remote teammates, and maintain a clear, auditable history. This exercise ensures all new hires follow a standardized development process, reducing merge conflicts and fostering consistent code quality across the organization. Success looks like a clean commit history, a merged pull request, and removal of the feature branch once work is complete.

Learning Objectives

- Create and configure a GitHub repository (public vs. private)
- Clone and initialize projects locally
- Create and switch branches
- Make and commit changes with descriptive messages
- Open, review, and merge pull requests
- Use both GUI (GitHub website) and CLI (Git, GitHub CLI) methods

Concepts Explained with Analogies

Repository
Analogy: A digital folder that holds every version of your project-like a library that archives all book editions.

Technical: A Git repository stores files, history, and branches in a single project container on GitHub

Branch
Analogy: A recipe variant-like making a gluten-free version of a cake without altering the original.
Technical: A branch is an independent line of development, isolated from the default `main` branch until merged

Commit
Analogy: A journal entry describing the changes you've made since the last entry.
Technical: A commit captures a snapshot of staged changes with a message explaining why they were made

Pull Request
Analogy: Submitting your edited chapter to an editor for review before it's added to the final book.
Technical: A pull request (PR) proposes merging one branch into another, shows diffs, and facilitates discussion and reviews

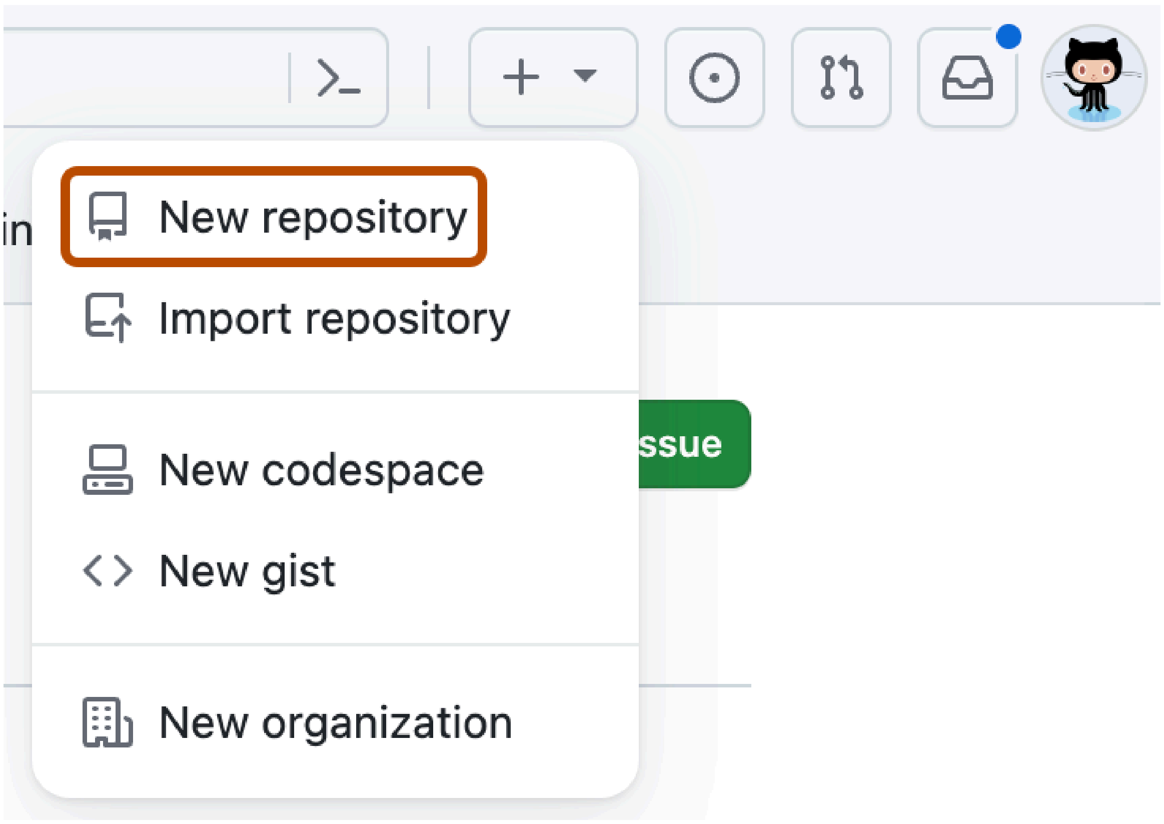
Merge
Analogy: Integrating your recipe variant back into the main cookbook, combining all approved changes.
Technical: A merge incorporates commits from a feature branch into another branch, often the default `main`

Step-by-Step Guided Walkthrough

Step 1: Create the Repository

GUI Method (GitHub Website)

1. In the upper-right corner of any page, select , then click **New repository**.



2. In the “Repository name” box, type `hello-world`.
3. In the “Description” box, type a short description. For example, type “This repository is for practicing the GitHub Flow.”
4. Select whether your repository will be **Public** or **Private**.
5. Select **Add a README file**.
6. Click **Create repository**.

CLI Method

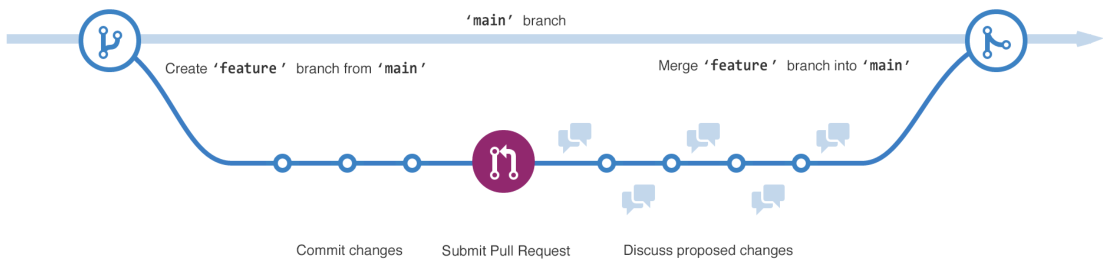
```
#Create local folder and initialize Git
mkdir hello-world && cd hello-world
git init                                                # Initialize local repo
#Add remote origin and push initial commit
git remote add origin https://github.com/<you>/hello-world.git
echo "# hello-world" > README.md
git add README.md
git commit -m "feat: initial commit with README" # Stage and commit
git push -u origin main                                 # Push to GitHub
```

Checkpoint: What is the purpose of the README file in your repo?

Step 2: Create a Feature Branch

This diagram shows:

- The `main` branch
- A new branch called `feature`
- The journey that `feature` takes through stages for "Commit changes," "Submit pull request," and "Discuss proposed changes" before it's merged into `main`

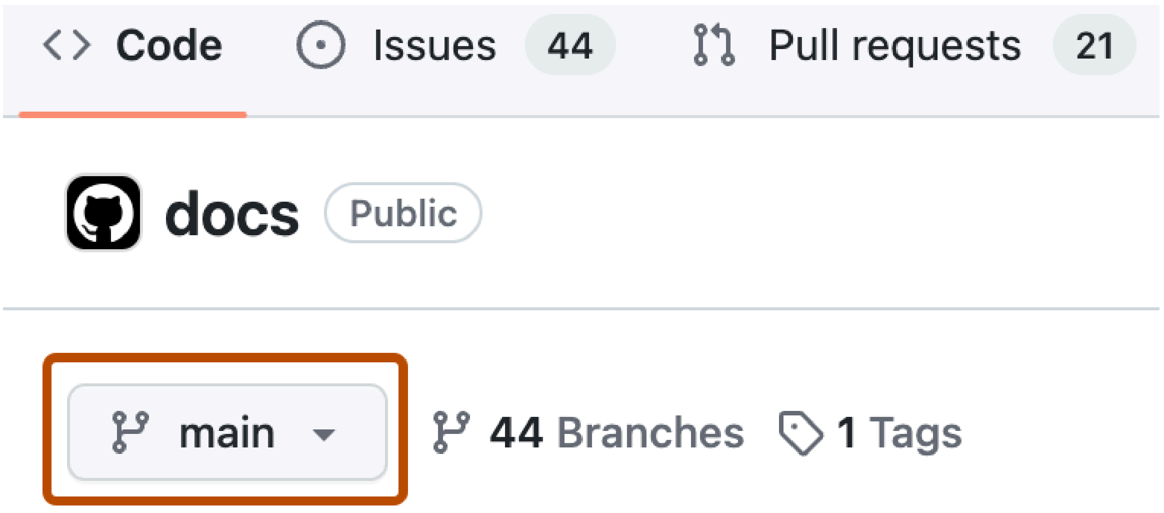


GUI Method

Creating a branch

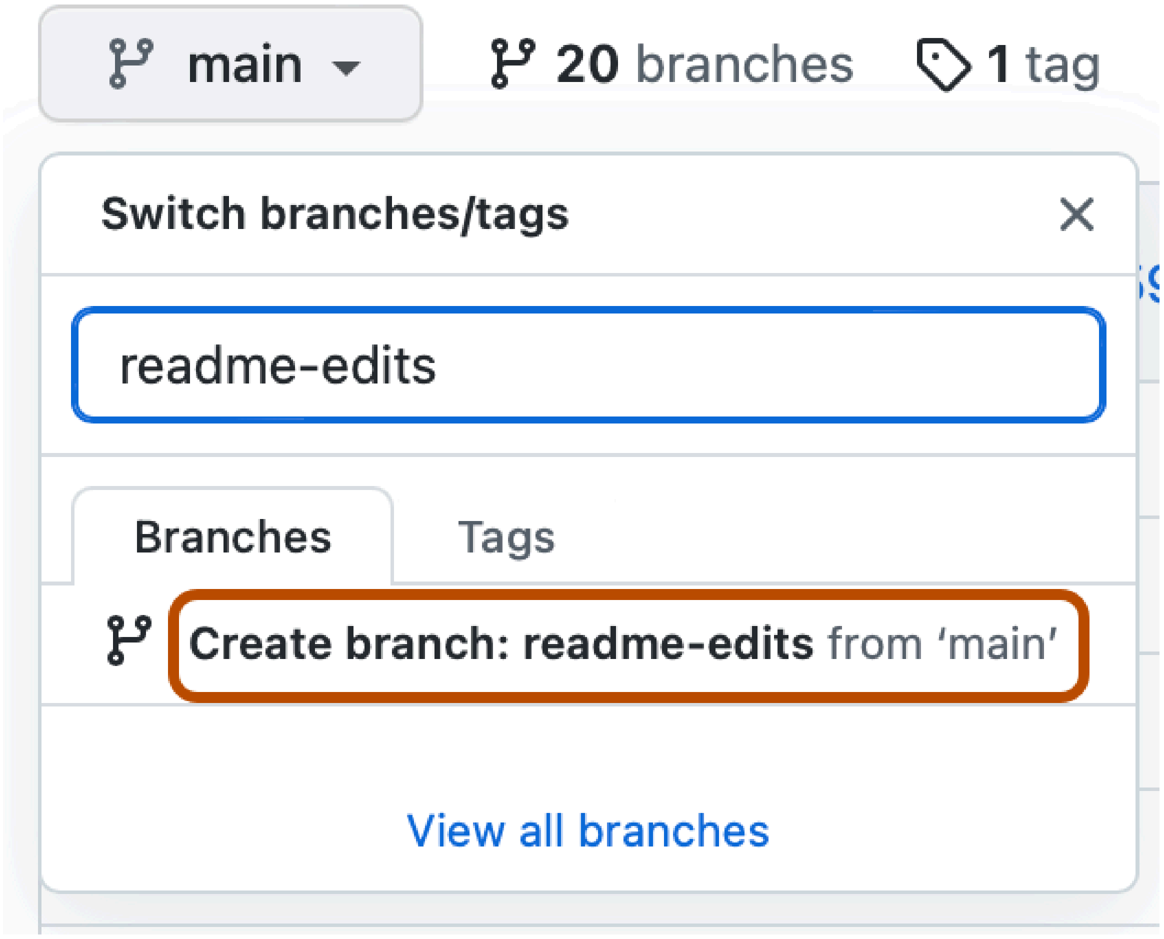
1. Click the **Code** tab of your `hello-world` repository.

2. Above the file list, click the dropdown menu that says **main**.



3. Type a branch name, `readme-edits`, into the text box.

4. Click **Create branch: readme-edits from main**.



Now you have two branches, `main` and `readme-edits`. Right now, they look exactly the same. Next you'll add changes to the new `readme-edits` branch.

CLI Method

```
git fetch origin && git checkout -b readme-edits origin/main  # Create & sw
```

Checkpoint: Why work on a branch instead of directly committing to `main`?

Step 3: Make and Commit Changes

GUI Method

- Under your `readme-edits` branch, open [README.md]() and click the pencil icon.
- Edit content (e.g., add a personal bio), scroll down, enter a commit message like "docs: add personal bio", and click **Commit changes**

CLI Method

```
nano README.md                               # Edit file locally
git add README.md                           # Stage changes[15]
git commit -m "docs: add personal bio" # Commit with message[15]
git push -u origin readme-edits         # Push branch to GitHub[15]
```

Checkpoint: How does staging (`git add`) differ from committing?

Step 4: Open a Pull Request

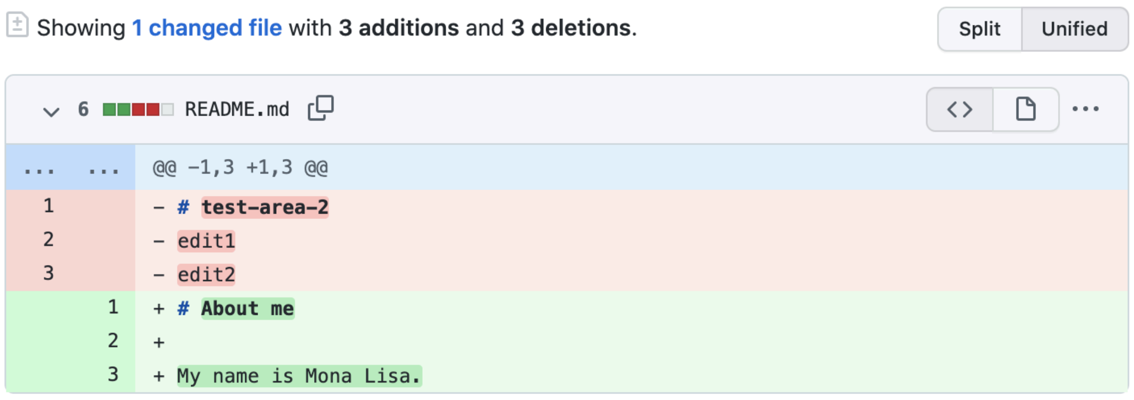
GUI Method

1. Click the **Pull requests** tab of your `hello-world` repository.

2. Click **New pull request**.

3. In the **Example Comparisons** box, select the branch you made, `readme-edits` , to compare with `main` (the original).

4. Look over your changes in the diffs on the Compare page, make sure they're what you want to submit.


Showing 1 changed file with 3 additions and 3 deletions.

```
@@ -1,3 +1,3 @@
- # test-area-2
- edit1
- edit2
+ # About me
+
+ My name is Mona Lisa.
```

5. Click **Create pull request**.

6. Give your pull request a title and write a brief description of your changes. You can include emojis and drag and drop images and gifs.

7. Click **Create pull request**.

CLI Method

```
gh pr create --base main --head readme-edits \
  --title "Update README with bio" \
  --body "Adds a short bio for practice"        # Create PR via GitHub CLI
```

Checkpoint: What key information should you include in a pull request description?

Step 5: Merge Your Pull Request

GUI Method

- Scroll to the bottom of the PR, click **Merge pull request**, then **Confirm merge**.
- Click **Delete branch** to remove `readme-edits` after merging

CLI Method

```
gh pr merge readme-edits --merge --delete-branch  # Merge and delete branch
```

Checkpoint: Why delete feature branches after merging?

Best Practices and Tips

- Use **imperative, concise commit messages** (e.g., "fix: typo in README") following community standards
- Keep branches **short-lived** and focused on a single task to minimize merge conflicts
- Always **pull** the latest `main` before creating or updating a branch (`git pull origin main`).
- Leverage **code reviews** in pull requests to catch errors early and share knowledge
- Delete merged branches to **reduce clutter** and indicate completed work

Real-World Application and Extension

- **CI Integration**: Add a GitHub Actions workflow to run tests on each PR.
- **Project Boards**: Use Issues and Projects to manage feature progress and bugs.
- **Community Contribution**: Explore “good first issues” in other repos and submit PRs to real-world projects