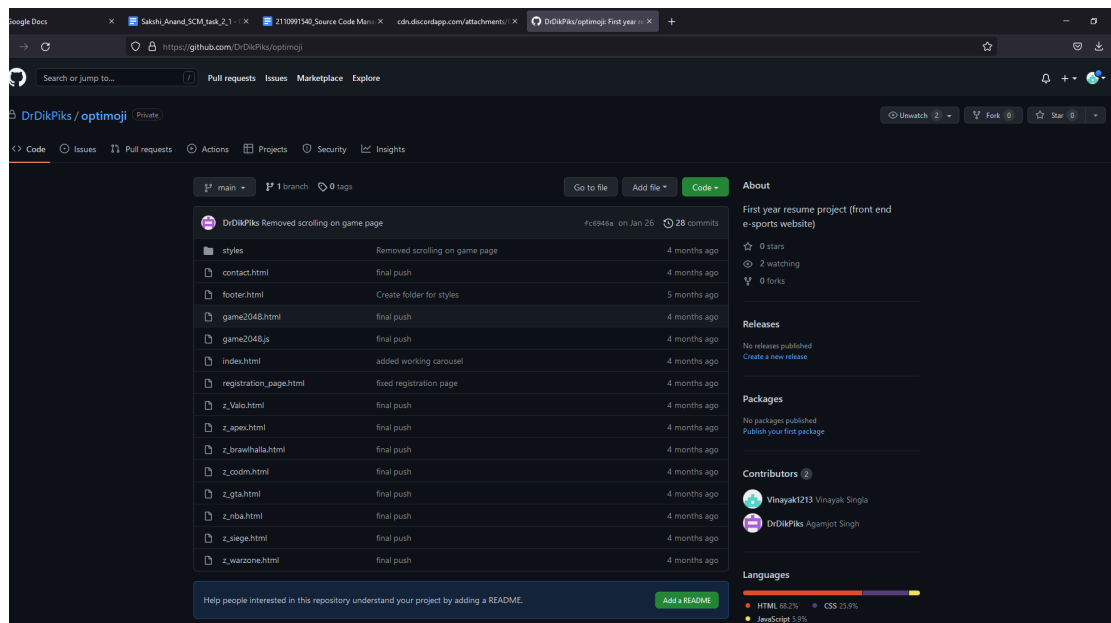


## RESOURCES

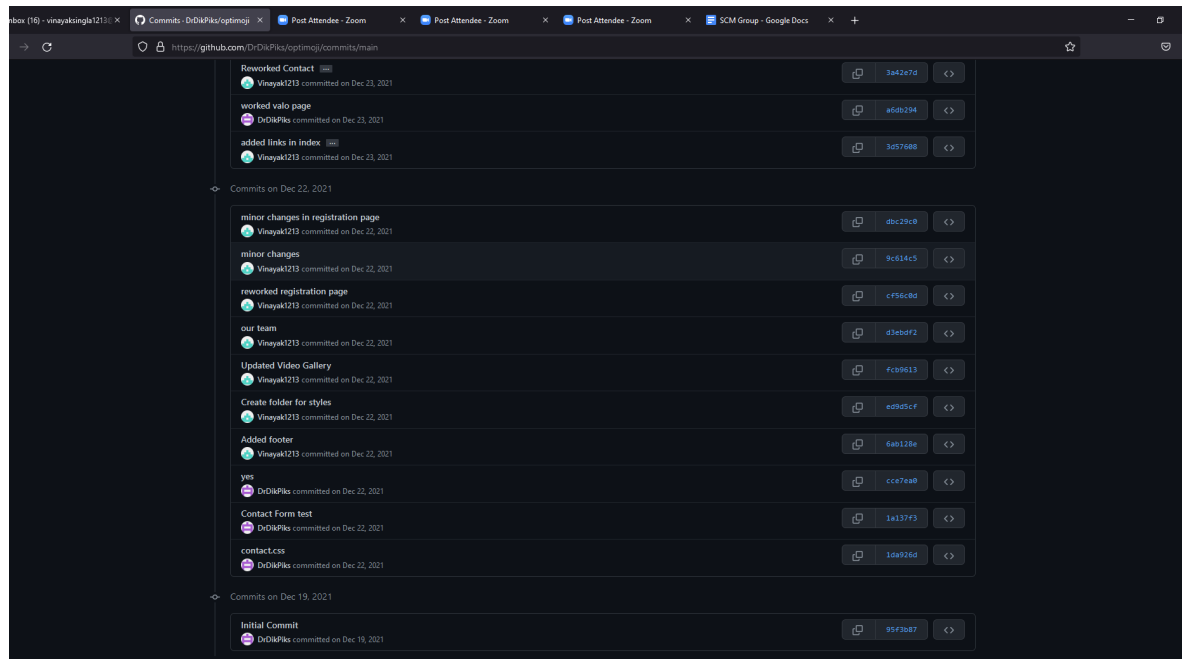
# VERSION CONTROL SYSTEM WITH GIT

Create a distributed Repository and add members in project team

- Login to your GitHub account and you will land on the homepage as shown below. Click on Repositories option in the menu bar.



- Click on the 'New' button in the top right corner.





- Enter the Repository name and add the description of the repository.
- Select if you want the repository to be public or private.
- Click to the create repository.

## Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository.](#)

---

**Owner \*** **Repository name \***


 Agamjot-Singh03 / SCM-Project 


Great repository names are short and memorable. Need inspiration? How about [animated-octo-succotash?](#)

**Description** (optional)

Source Code Management Project of : Vinayak Singla (1540), Agamjot Singh (1622), Akash Mishra (1629), Hars

---

☐  **Public**  
Anyone on the internet can see this repository. You choose who can commit.

☒  **Private**  
You choose who can see and commit to this repository.

---

**Initialize this repository with:**  
Skip this step if you're importing an existing repository.

☐ **Add a README file**  
This is where you can write a long description for your project. [Learn more.](#)


**Add .gitignore**  
Choose which files not to track from a list of templates. [Learn more.](#)

.gitignore template: None

**Choose a license**  
A license tells others what they can and can't do with your code. [Learn more.](#)

License: None

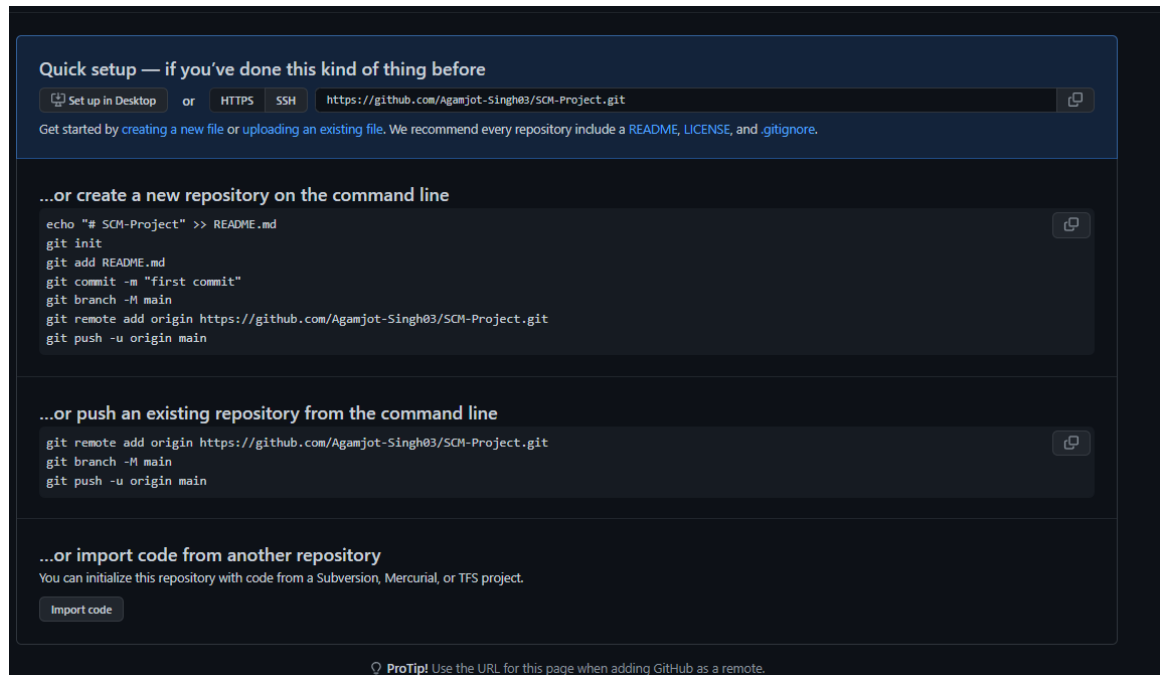
---

 You are creating a private repository in your personal account.

---

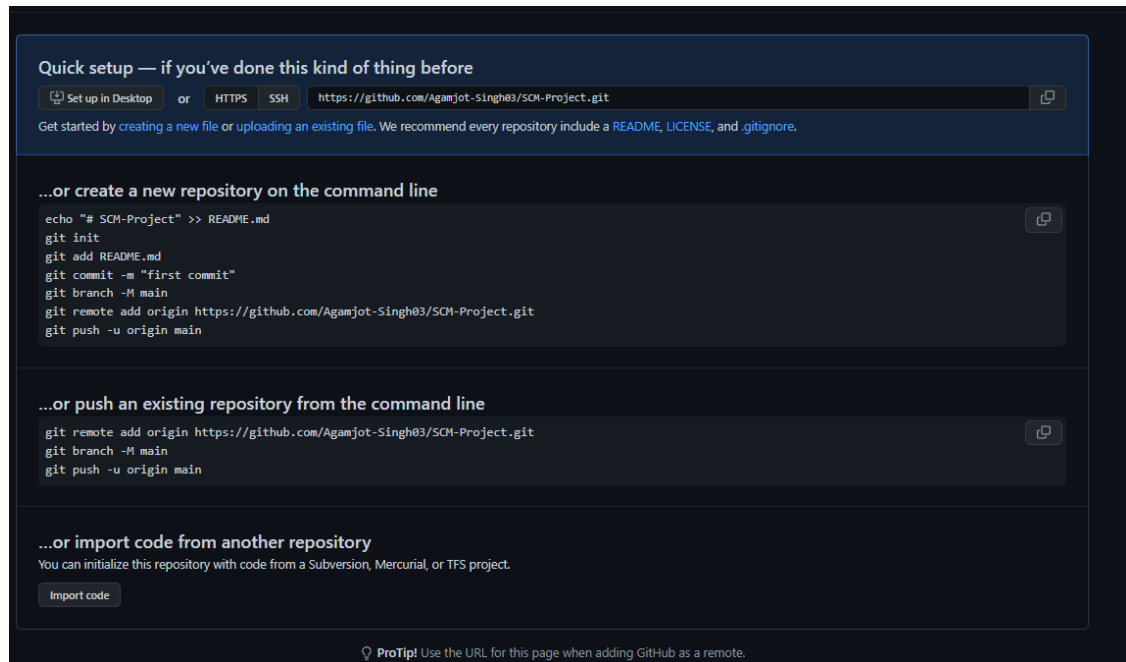
**Create repository**

- If you want to import code from an existing repository select the

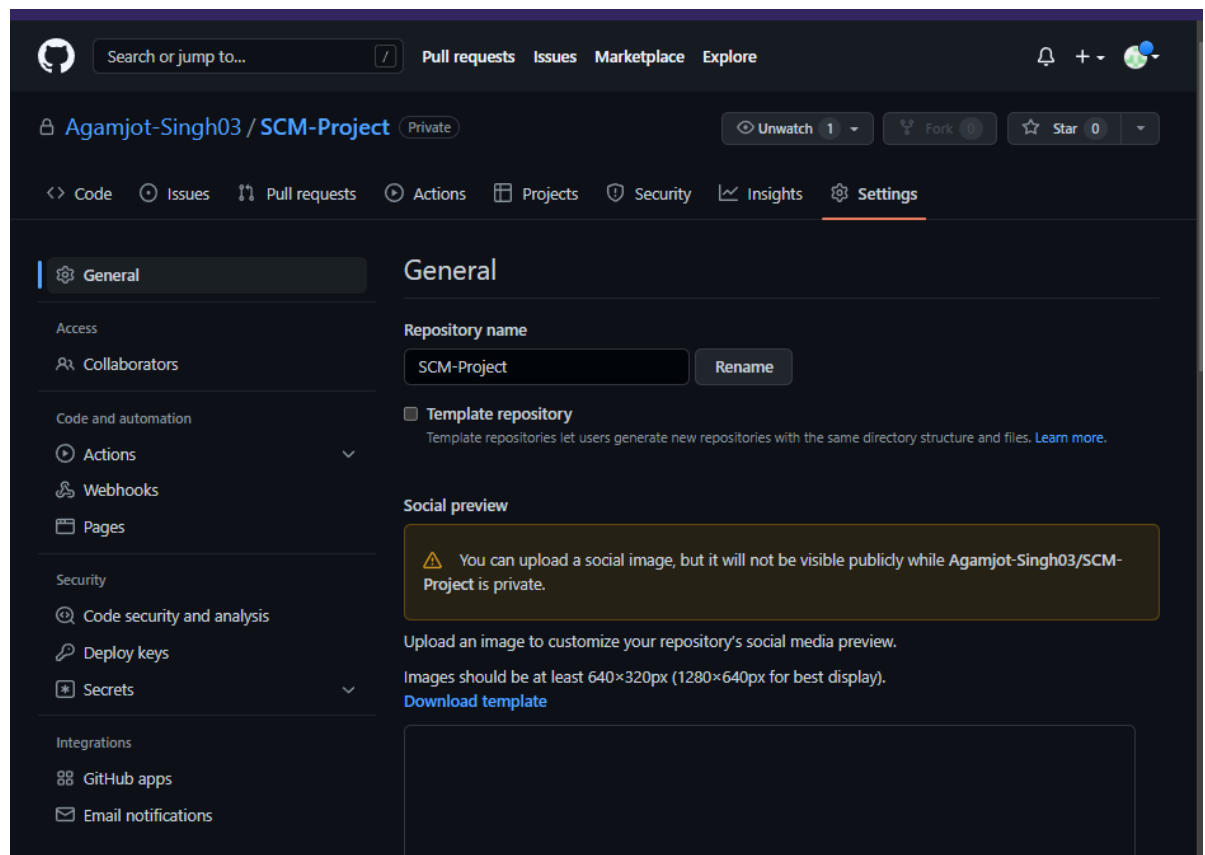


import code option.

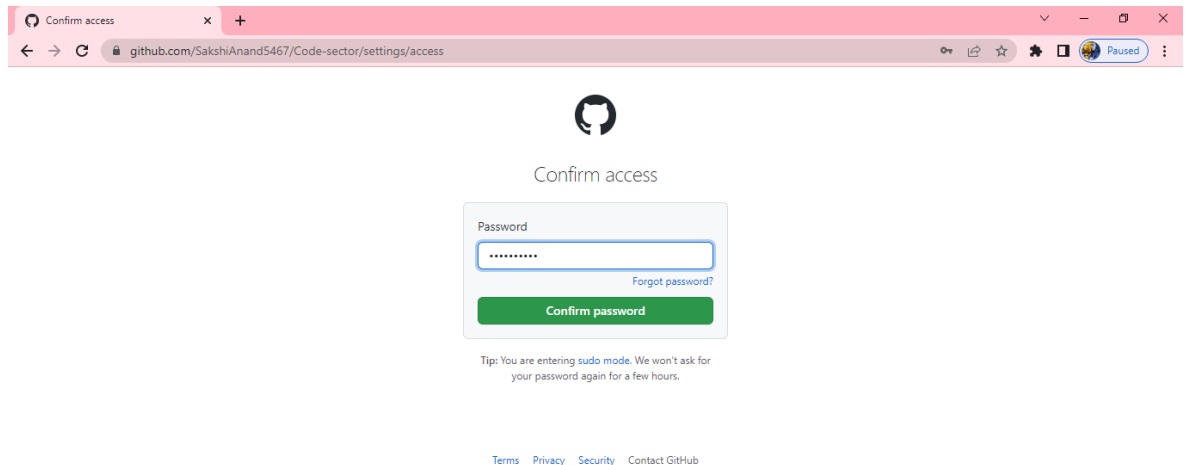
- Now, you have created your repository successfully.
- To add members to your repository, open your repository and select the settings option in the navigation bar.




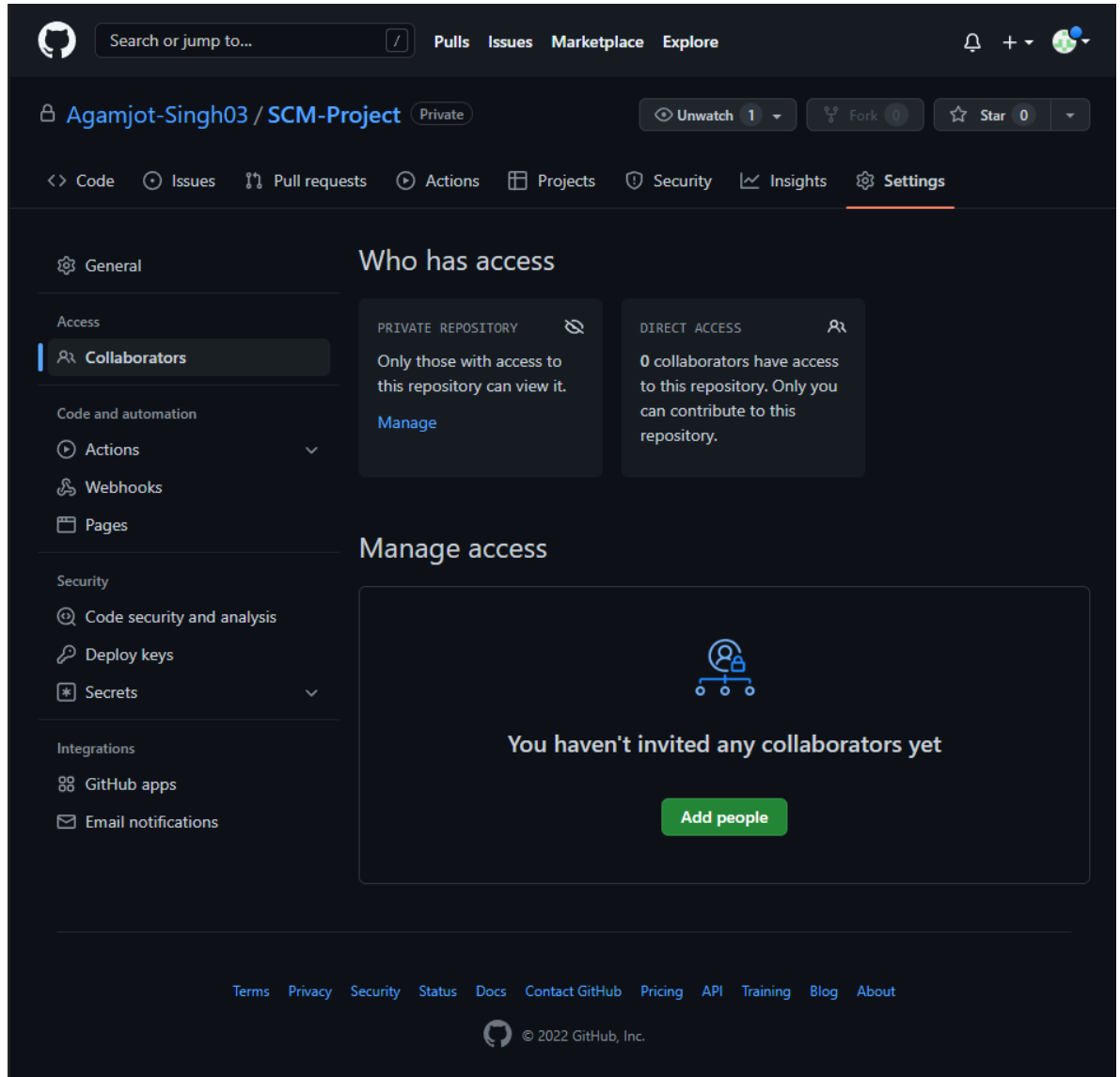
- Click on Collaborators option under the access tab.
- 



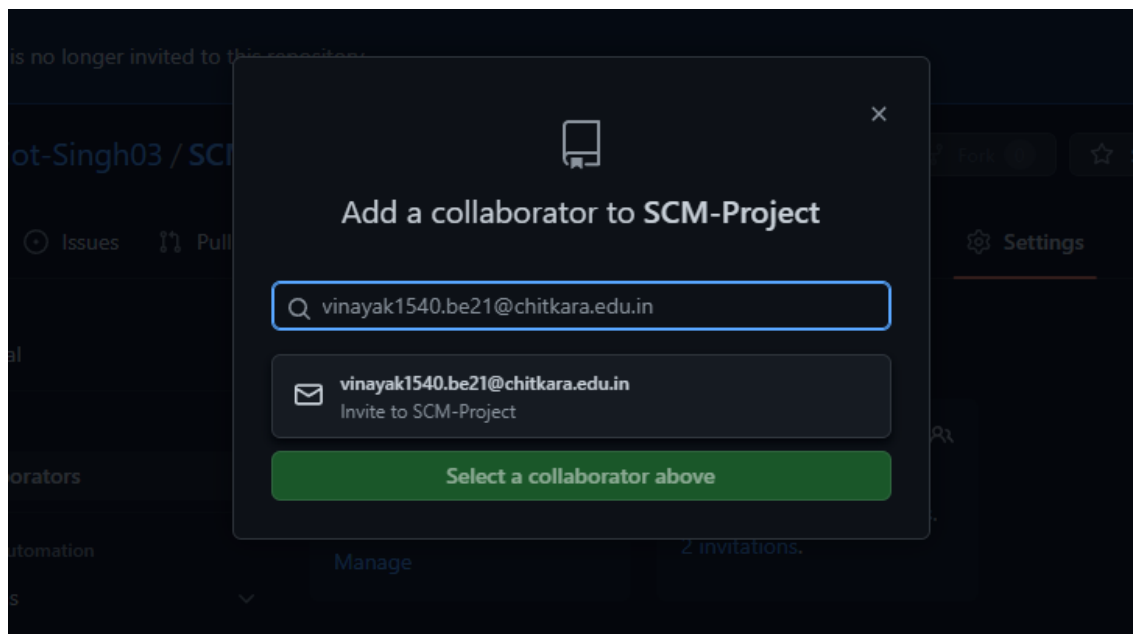
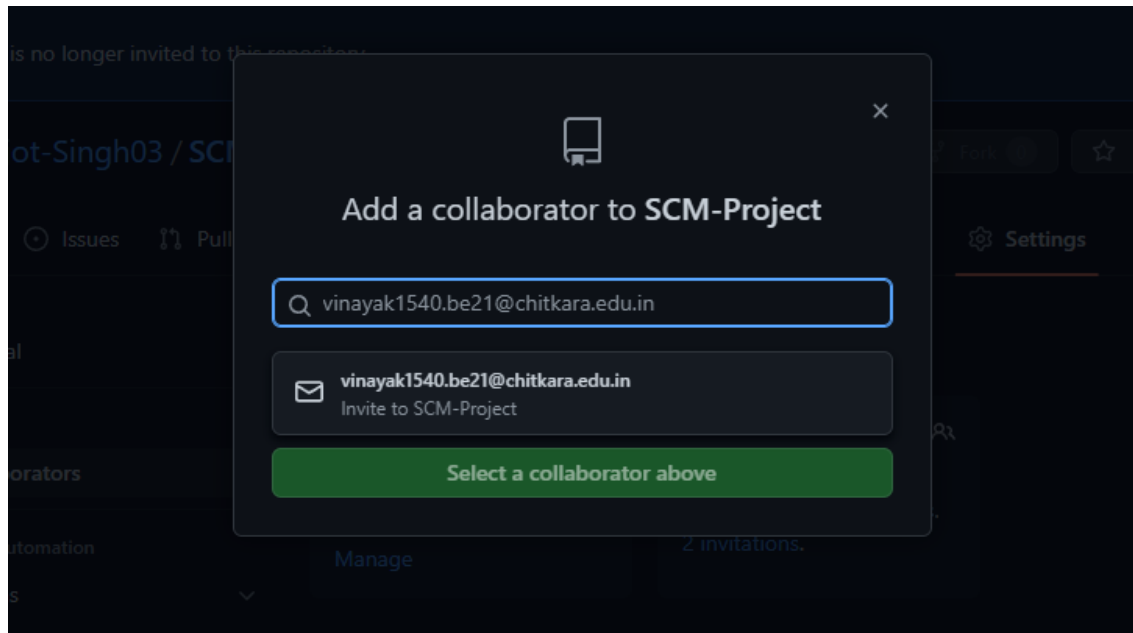
- After clicking on collaborators GitHub asks you to enter your password to confirm the access to the repository.



- 
- After entering the password, you can manage access and add/remove team members to your project.
- To add members, click on the add people option and search the id of your respective team member.

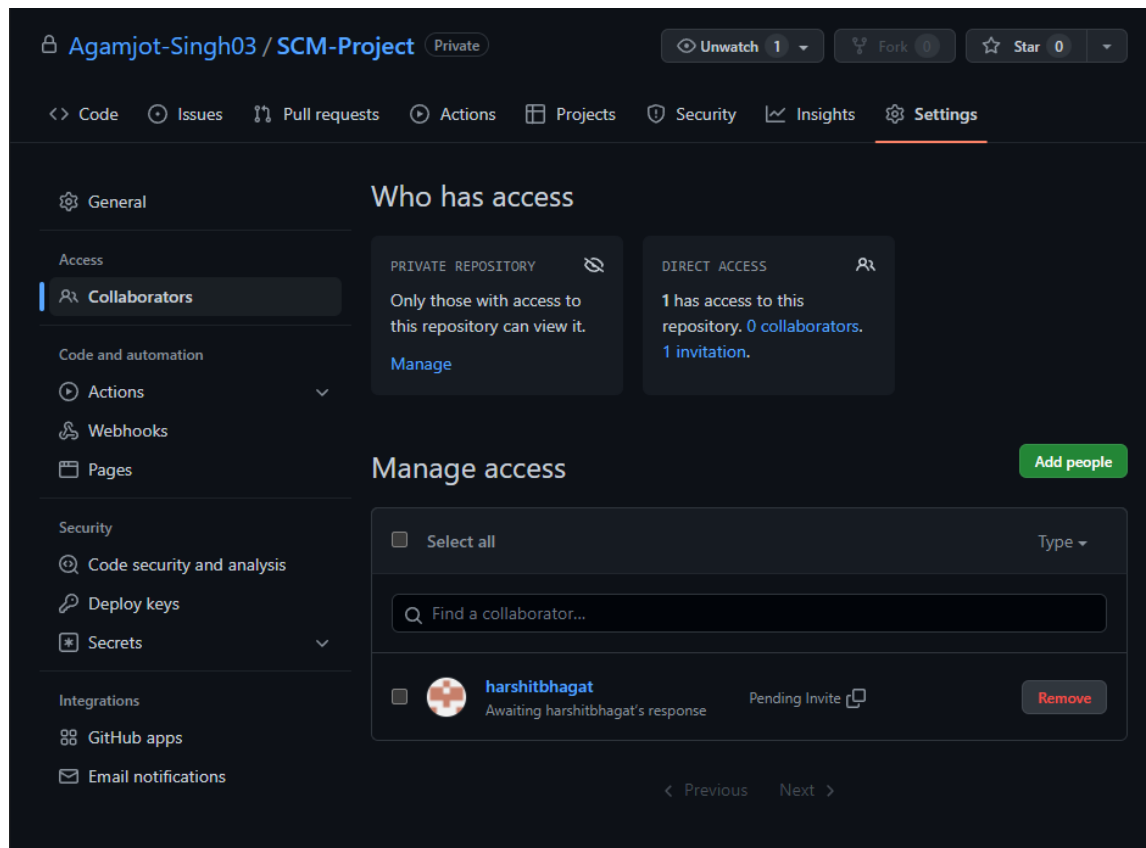


The screenshot shows the GitHub repository settings page for a private repository named 'SCM-Project' by user 'Agamjot-Singh03'. The page is in dark mode. At the top, there's a navigation bar with links for Pulls, Issues, Marketplace, and Explore. Below this, the repository name and 'Private' status are shown, along with buttons for Unwatch (1), Fork (0), and Star (0). A secondary navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Security, Insights, and Settings (which is highlighted). The left sidebar contains a 'General' section with a list of settings: Access (highlighted), Collaborators, Code and automation (with sub-items Actions and Webhooks), Pages, Security (with sub-items Code security and analysis, Deploy keys, and Secrets), and Integrations (with sub-items GitHub apps and Email notifications). The main content area is titled 'Who has access' and is divided into two panels: 'PRIVATE REPOSITORY' and 'DIRECT ACCESS'. The 'PRIVATE REPOSITORY' panel states that only those with access can view it and includes a 'Manage' link. The 'DIRECT ACCESS' panel shows that 0 collaborators have access and only the user can contribute. Below this is a 'Manage access' section with a large box containing a lock icon and the text 'You haven't invited any collaborators yet', with a green 'Add people' button. The footer contains links for Terms, Privacy, Security, Status, Docs, Contact GitHub, Pricing, API, Training, Blog, and About, followed by the GitHub logo and copyright notice '© 2022 GitHub, Inc.'

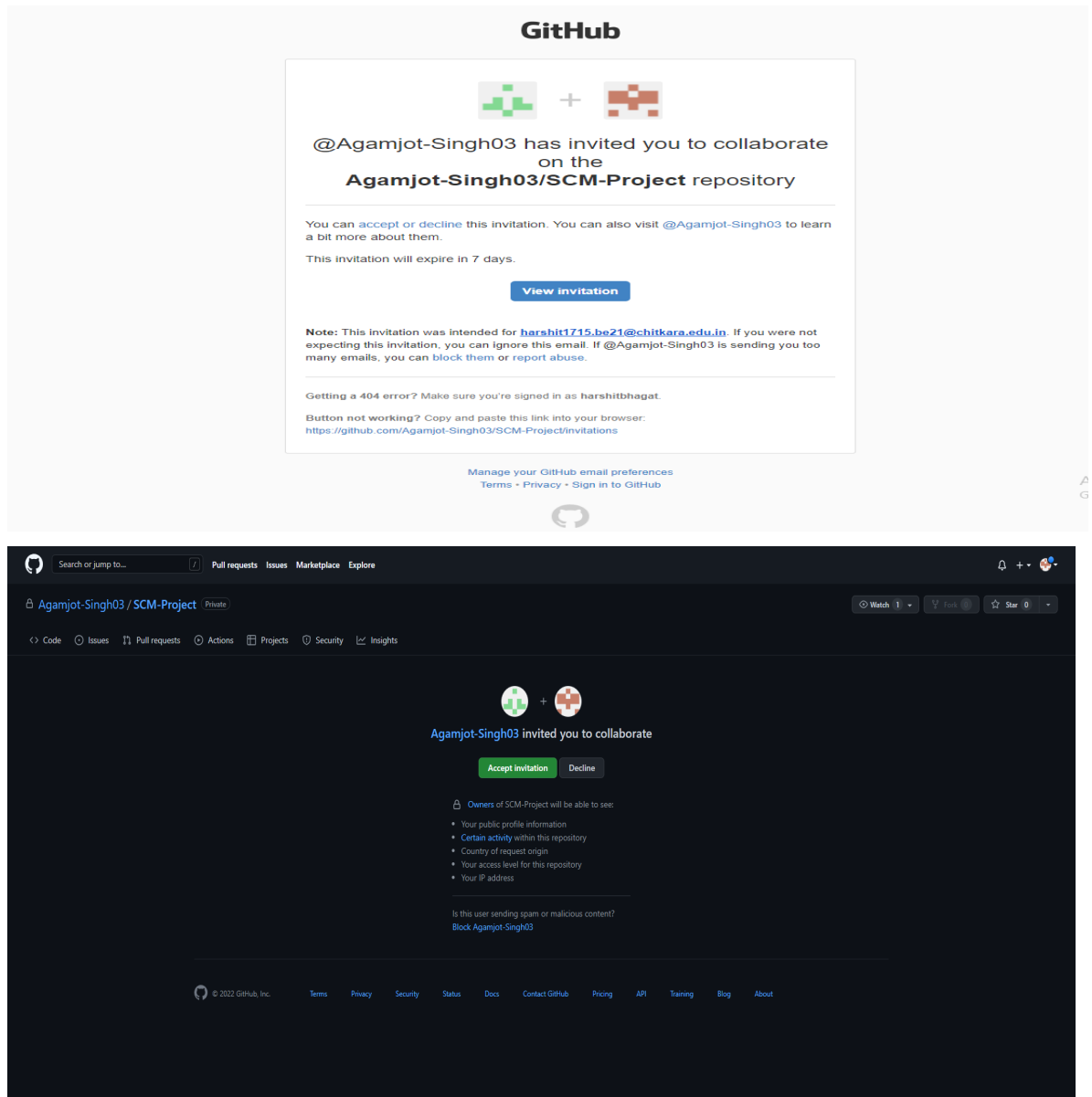


- Now, click on green box to add member in your repository.
- To remove any member, click on remove option available in the last column of the member's respective row.



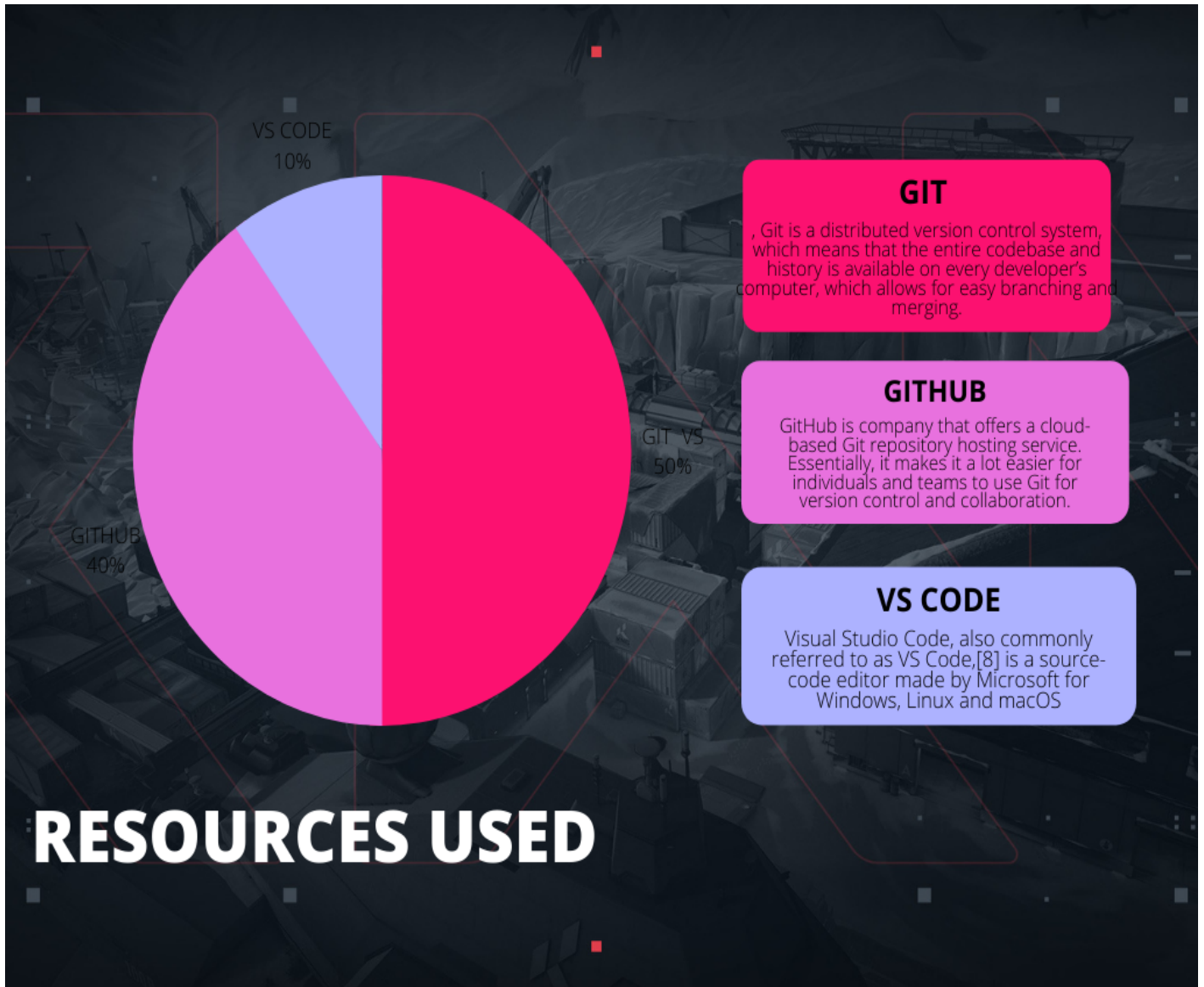


- To accept the invitation from your team member, open your email registered with GitHub.
- You will receive an invitation mail from the repository owner. Open the email and click on accept invitation.
- You will be redirected to GitHub where you can either select to accept or decline the invitation.



- Now all members are ready to contribute to the project.

## RESOURCES USED



## PROBLEM STATEMENT



### 1. Performance

Git performs very strongly and reliably when compared to other version control systems. New code changes can be easily committed, version branches can be effortlessly compared and merged, and code can also be optimized to perform better. Algorithms used in developing Git take the full advantage of the deep knowledge stored within, with regards to the attributes used to create real source code file trees, how files are modified over time and what kind of file access patterns are used to recall code files as and when needed by developers. Git primarily focuses upon the file content itself rather than file names while

determining the storage and file version history. Object formats of Git repository files use several combinations of delta encoding and compression techniques to store metadata objects and directory contents.

## **2. Security**

Git is designed specially to maintain the integrity of source code. File contents as well as the relationship between file and directories, tags, commits, versions etc. are secured cryptographically using an algorithm called SHA1 which protects the code and change history against accidental as well as malicious damage. You can be sure to have an authentic content history for your source code with Git.

## **3. Flexibility**

A key design objective of Git is the kind of flexibility it offers to support several kinds of nonlinear development workflows and its efficiency in handling both small scale and large scale projects as well as protocols. It is uniquely designed to support tagging and branching operations and store each and every activity carried out by the user as an integral part of “change” history. Not all VCSs support this feature.

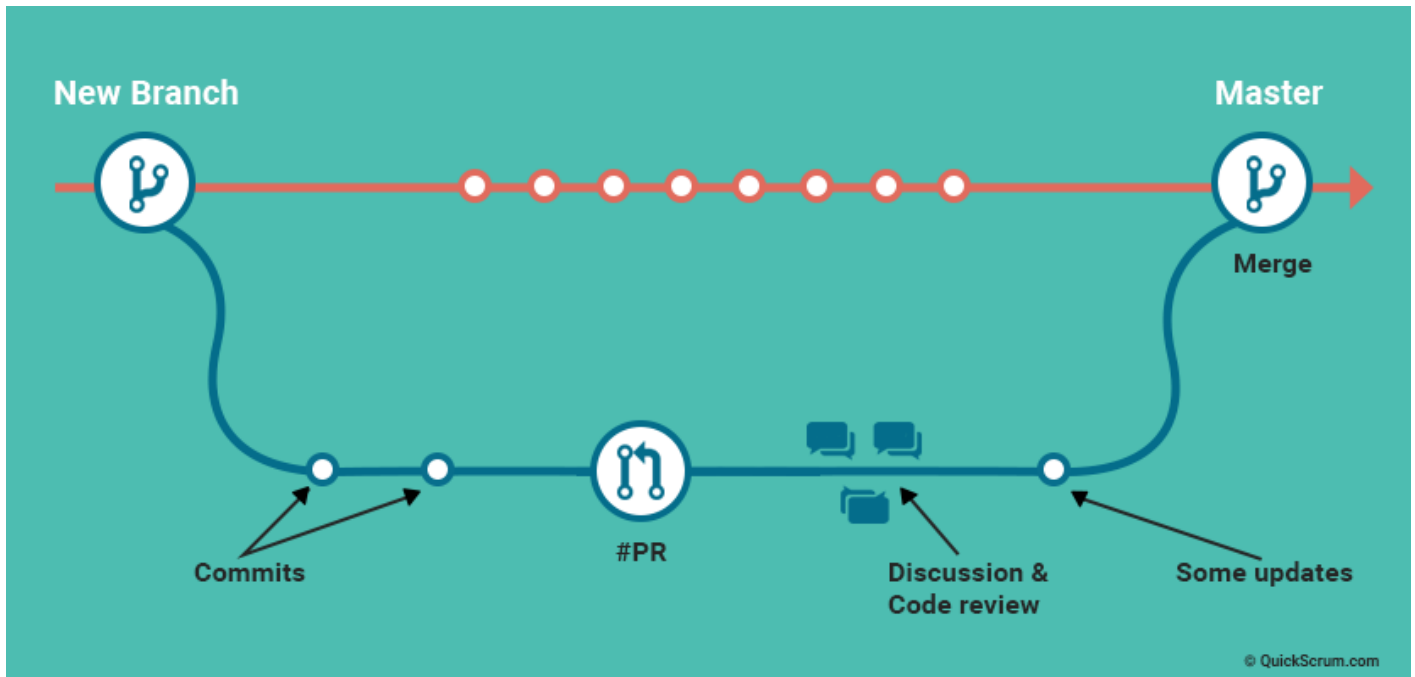
## **4. Wide acceptance**

Git offers the type of performance, functionality, security, and flexibility that most developers and teams need to develop their projects. When compared to other VCS Git is the most widely accepted system owing to its universally accepted usability and performance standards.

## **5. Quality open source project**

Git is a widely supported open source project with over ten years of operational history. People maintaining the project are very well matured and possess a long-term vision to meet the long-term needs of users by releasing staged upgrades at regular intervals of time to improve functionality as well as usability. Quality of open source software made available on Git is heavily scrutinized a countless number of times and businesses today depend heavily on Git code quality.

## **Pull Requests**



A developer calls a pull request to ask another developer to merge one of his/her branches into the other's repository. Besides making it a lot easier for project leaders to monitor and track code changes, "pulling" also facilitates other developers to discuss their work before integrating the code with the codebase. Moreover, if a developer can't continue work owing to some hard technical problem, he/she can initiate a pull request to seek help from the rest of the team.

We are going to represent the Problem Statement through one of the examples which will help us to understand better how it can reduce the work time and in this particular example we are going to cover how we can pull a repository directly from github instead of sending the file to a number of the users individually. How one can pull directly from Github by following some basic steps

## Open and Close a Pull Request

- To open a pull request we first have to make a new branch, by using git branch.
- After making a new branch we add a file to the branch or make change in the existing file.

```
MINGW64~/Users/Vinayak Singla/Desktop/SCM Project
Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (master)
$ git add -A

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (master)
$ git commit -m "initialCommit"
[master (root-commit) 17fe379] initialCommit
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 initialCommit.txt

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (master)
$ git branch "MachineLearning"

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (master)
$ git checkout "MachineLearning"
Switched to branch 'MachineLearning'

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (MachineLearning)
$ git add -A

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (MachineLearning)
$ git commit -m "Machine Learning branch text file added"
[MachineLearning 2dd4608] Machine Learning branch text file added
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 MachineLearning.txt

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (MachineLearning)
$ git status
On branch MachineLearning
nothing to commit, working tree clean

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (MachineLearning)
$ git checkout "master"
Switched to branch 'master'

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (master)
$ git merge "MachineLearning"
Updating 17fe379..2dd4608
Fast-forward
 MachineLearning.txt | 0
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 MachineLearning.txt

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (master)
$ git log
commit 2dd4608f093ec30f8ceea8e6e68ef2a31b7283cd (HEAD -> master, MachineLearning)
Author: Vinayak Singla <vinayaksingla1213@gmail.com>
Date: Wed Apr 13 00:13:00 2022 -0800

    Machine Learning branch text file added

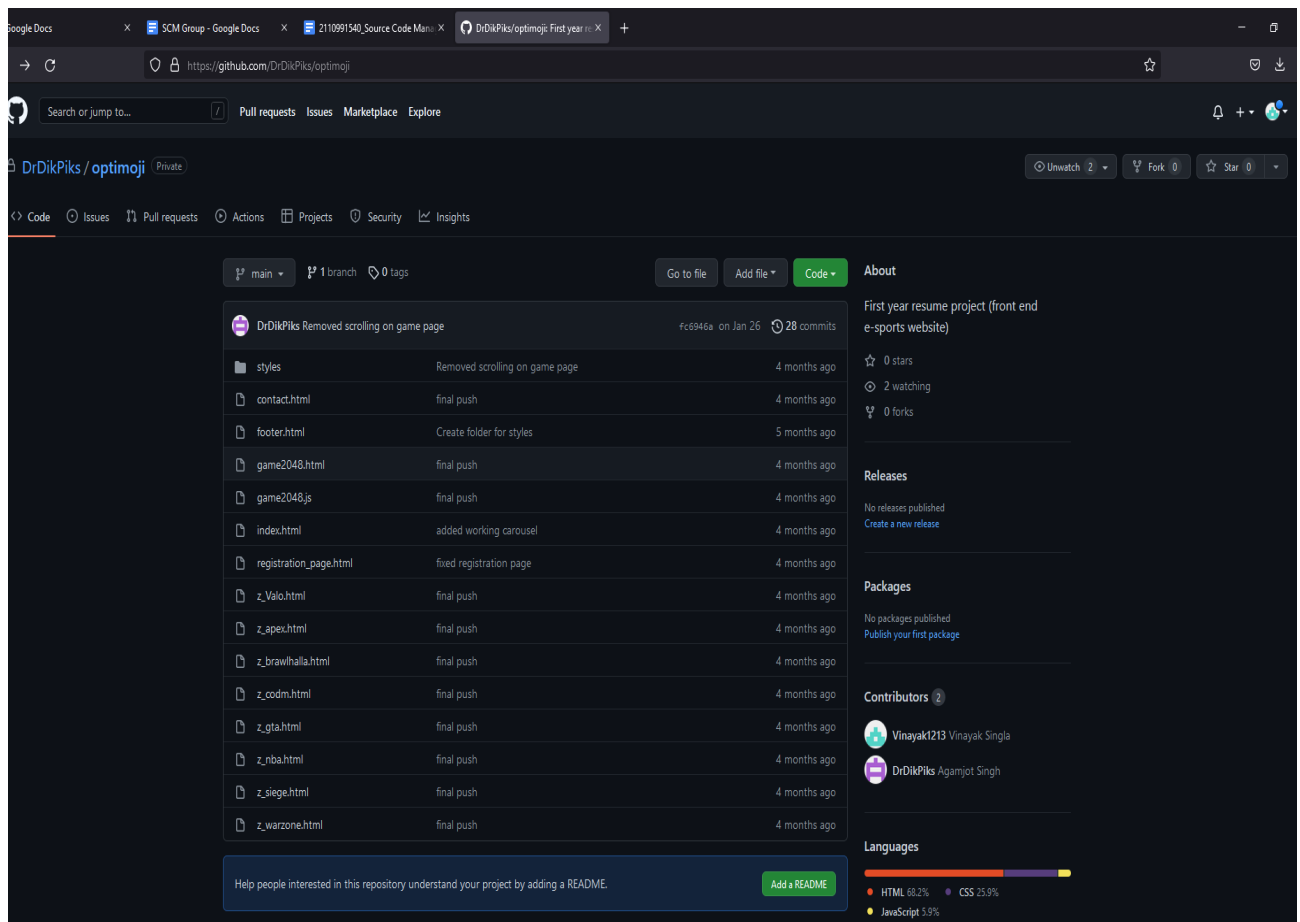
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 MachineLearning.txt
```

- Use git push origin to push the new branch to the main repository.

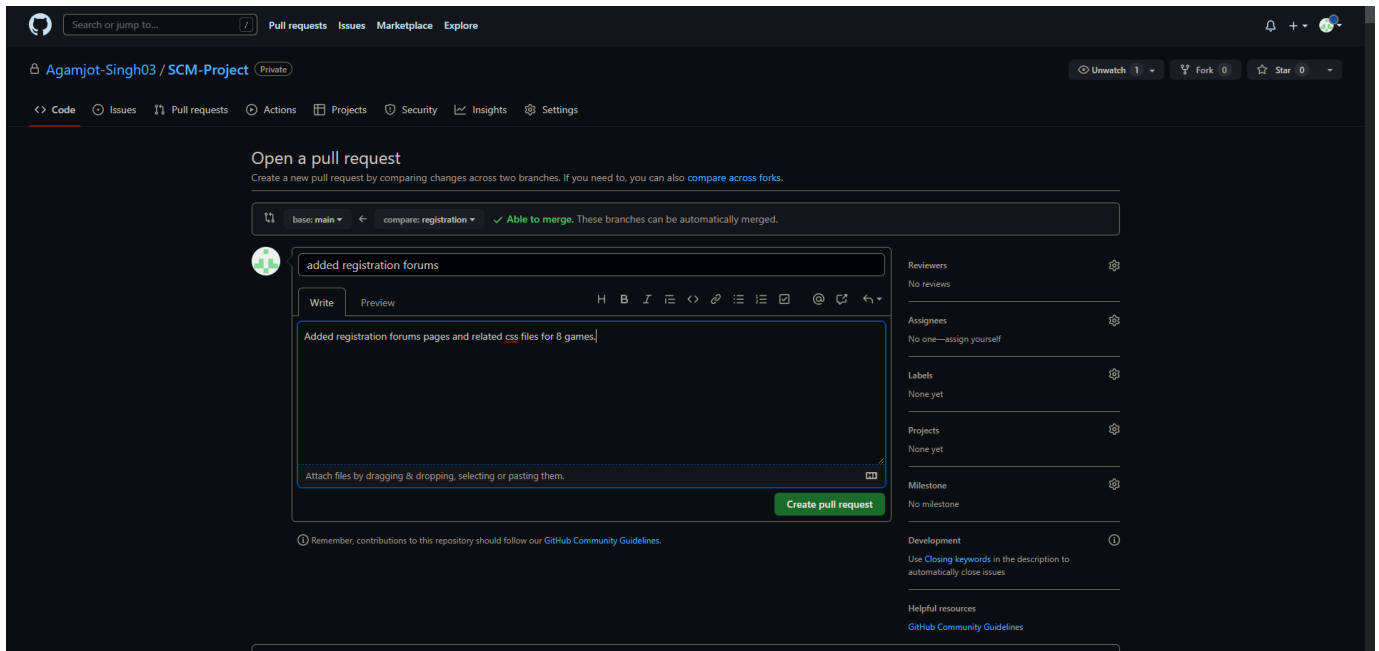
```
Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (MachineLearning)
$ git add -A

Vinayak Singla@MSI MINGW64 ~/Desktop/SCM Project (MachineLearning)
$ git commit -m "Machine Learning branch text file added"
[MachineLearning 2dd4608] Machine Learning branch text file added
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 MachineLearning.txt
```

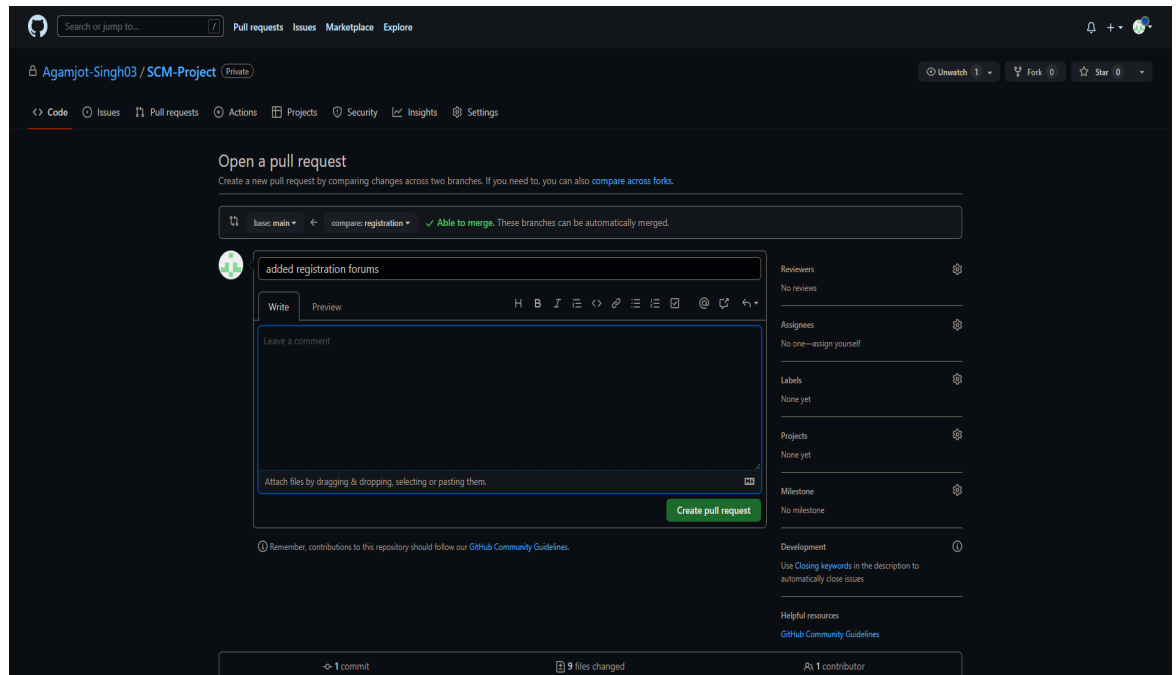
- After pushing new branch GitHub will either automatically ask you to create a pull request or you can create your own pull request by selecting the option compare & pull request.







- To create your own pull request, click on create pull request option.
- GitHub will detect any conflicts and ask you to enter a description of your pull request.
- After opening a pull request all the team members will be sent the request if they want to merge or close the request.



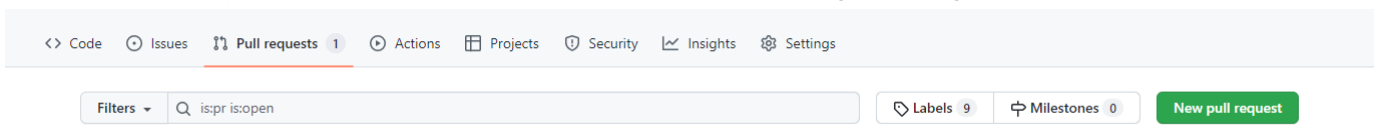
- If the team member chooses not to merge your pull request they will close the pull request.
- To close the pull request simply click on close pull request and add comment/ reason why you closed the pull request.
- You can see all the pull requests generated and how they were dealt with by clicking on pull request option.

## CONCEPTS, COMMANDS AND OBJECTIVE

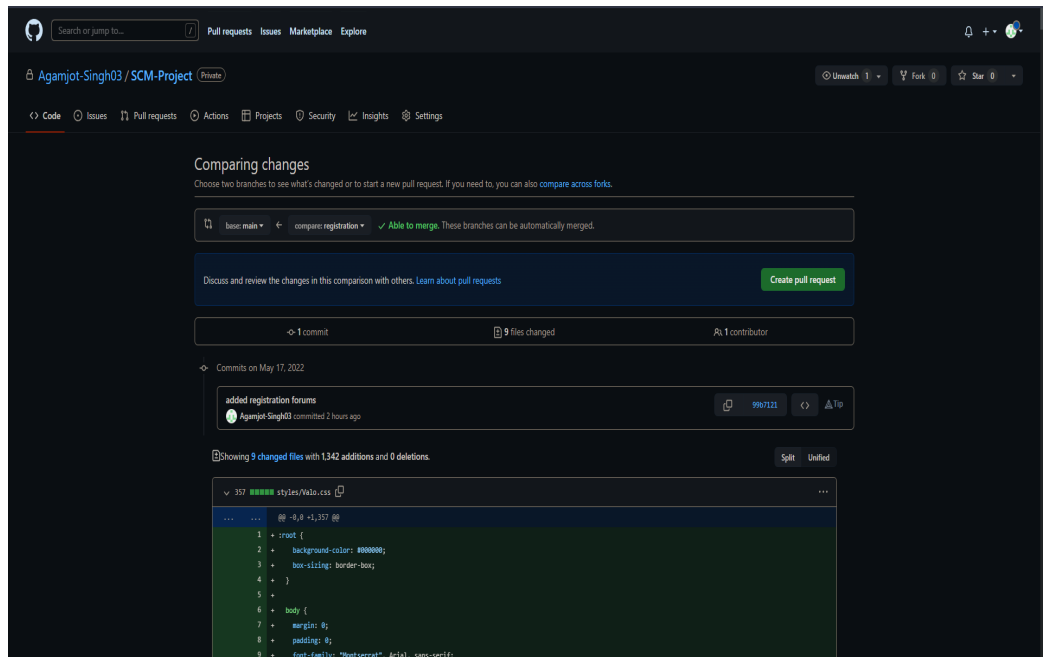
Aim: Create a pull request on a team member's repo and close pull requests generated by team members on own Repo as a maintainer

To create a pull request on a team member's repository and close requests by any other team members as a maintainer follow the procedure given below: -

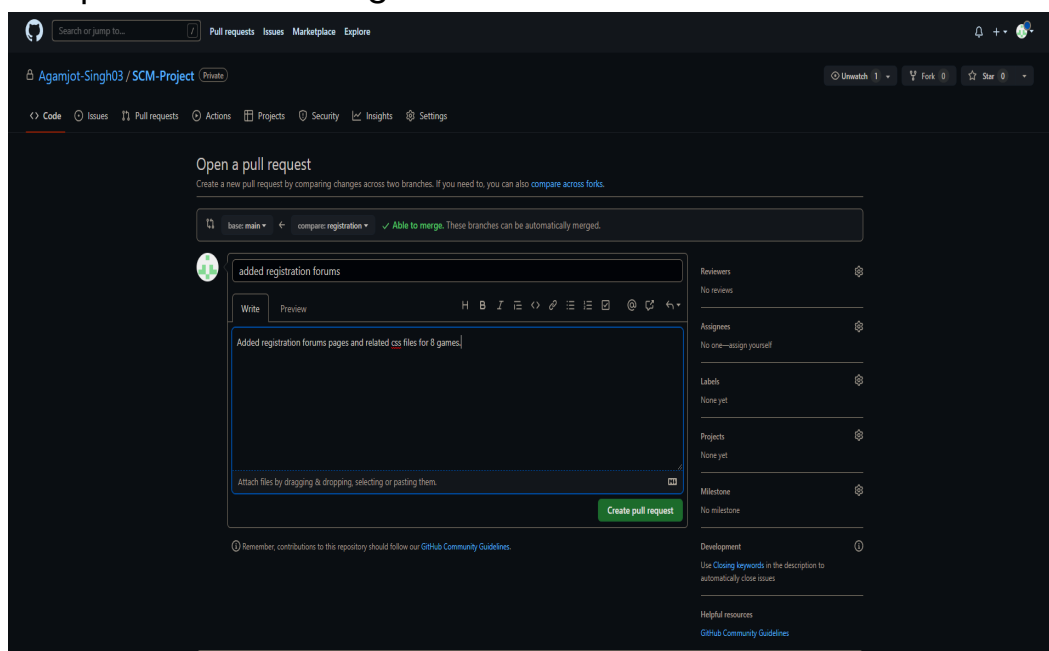
- Do the required changes in the repository, add and commit these changes in the local repository in a new branch.
- Push the modified branch using git push origin branchname.
- Open a pull request by following the procedure from the above experiment.
- The pull request will be created and will be visible to all the team members.
- Ask your team member to login to his/her Github account.
- They will notice a new notification in the pull request menu.



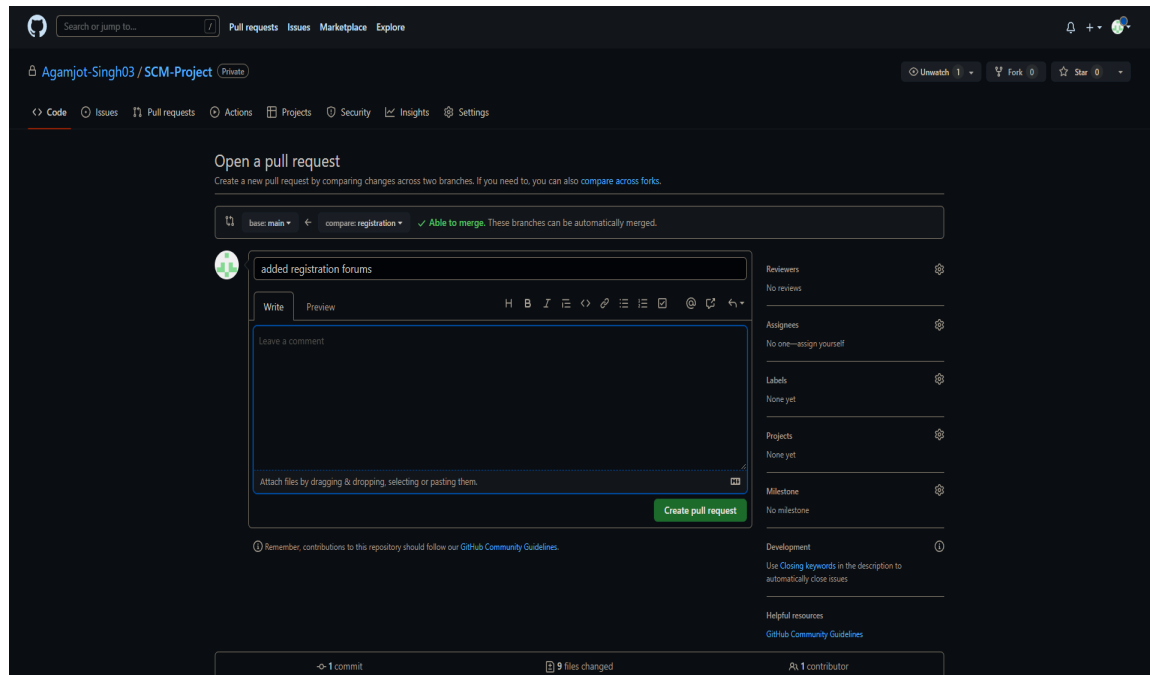
- Click on it. The pull request generated by you will be visible to them.



- Click on the pull request. Two options will be available, either to close the pull request or merge the request with the main branch.
- By selecting the merge pull request, the main branch will get updated for all the team members.
- By selecting close the pull request the pull request is not accepted and not merged with the main branch.



- The process is similar to closing and merging the pull request by you. It simply includes an external party to execute.
- The result of merging the pull request is shown below.



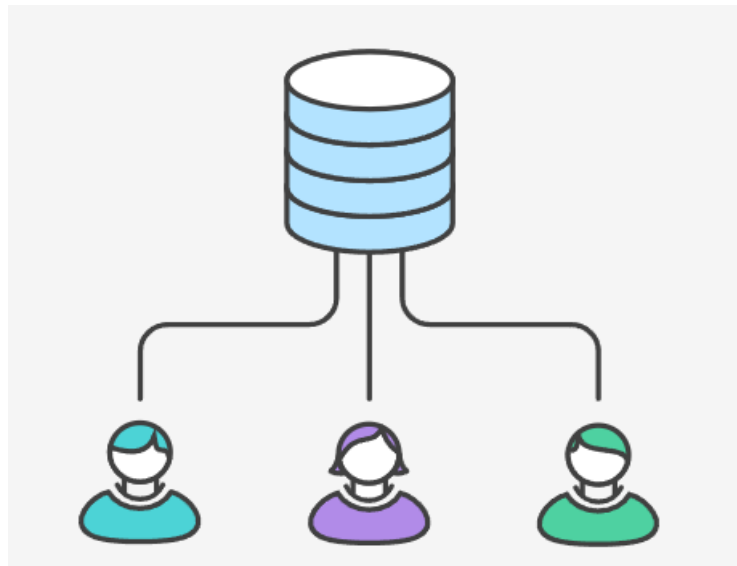
## FLOWCHART, WORKFLOW AND DISCUSSIONS IN GIT

### FLOWCHART AND WORKFLOW

## What is a successful Git workflow?

When evaluating a workflow for your team, it's most important that you consider your team's culture. You want the workflow to enhance the effectiveness of your team and not be a burden that limits productivity. Some things to consider when evaluating a Git workflow are:

- Does this workflow scale with team size?
- Is it easy to undo mistakes and errors with this workflow?
- Does this workflow impose any new unnecessary cognitive overhead to the team?



## Centralized Workflow

The Centralized Workflow is a great Git workflow for teams transitioning from SVN. Like Subversion, the Centralized Workflow uses a central repository to serve as the single point-of-entry for all changes to the project. Instead of trunk, the default development branch is called main and all changes are committed into this branch. This workflow doesn't require any other branches besides main.

It gives every developer their own local copy of the entire project. This isolated environment lets each developer work independently of all other changes to a project - they can add commits to their local repository and completely forget about upstream developments until it's convenient for them.

## How it works

Developers start by cloning the central repository. In their own local copies of the project, they edit files and commit changes these new commits are stored locally - they're completely isolated from the central repository. This lets developers defer synchronizing upstream until they're at a convenient break point.

To publish changes to the official project, developers "push" their local main branch to the central repository.

- **Initialize the central repository**

First, someone needs to create the central repository on a server.

Central repositories should always be bare repositories

Be sure to use a valid SSH username for user, the domain or IP address of your server for host, and the location where you'd like to store your repo

- **Hosted central repositories**

Central repositories are often created through 3rd party Git hosting services

The hosting service will then provide an address for the central repository to access from your local repository.

- **Clone the central repository**

Next, each developer creates a local copy of the entire project. This is accomplished via the git clone command:

- **Make changes and commit**

Once the repository is cloned locally, a developer can make changes using the standard Git commit process: edit, stage, and commit.

- **Push new commits to central repository**

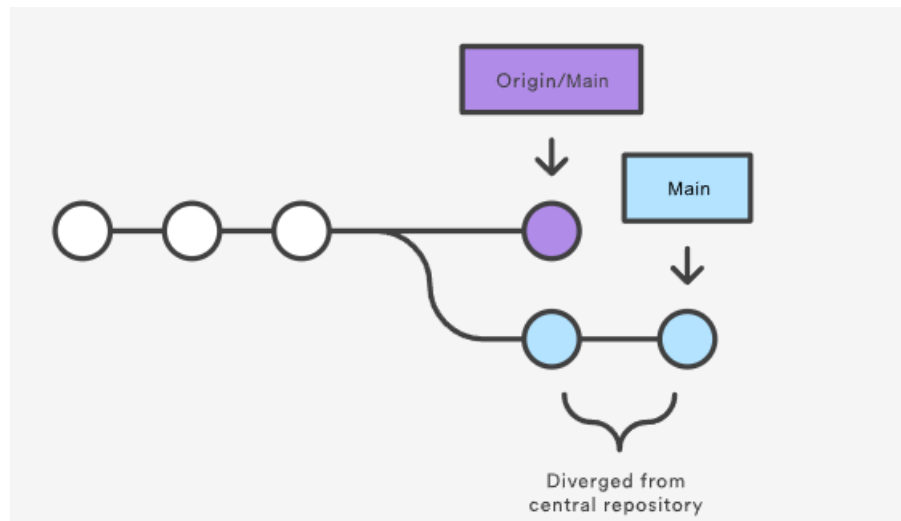
Once the local repository has new changes committed. These change will need to be pushed to share with other developers on the project.

This is accomplished via the git push origin command

```
git push origin main
```

- **Managing conflicts**

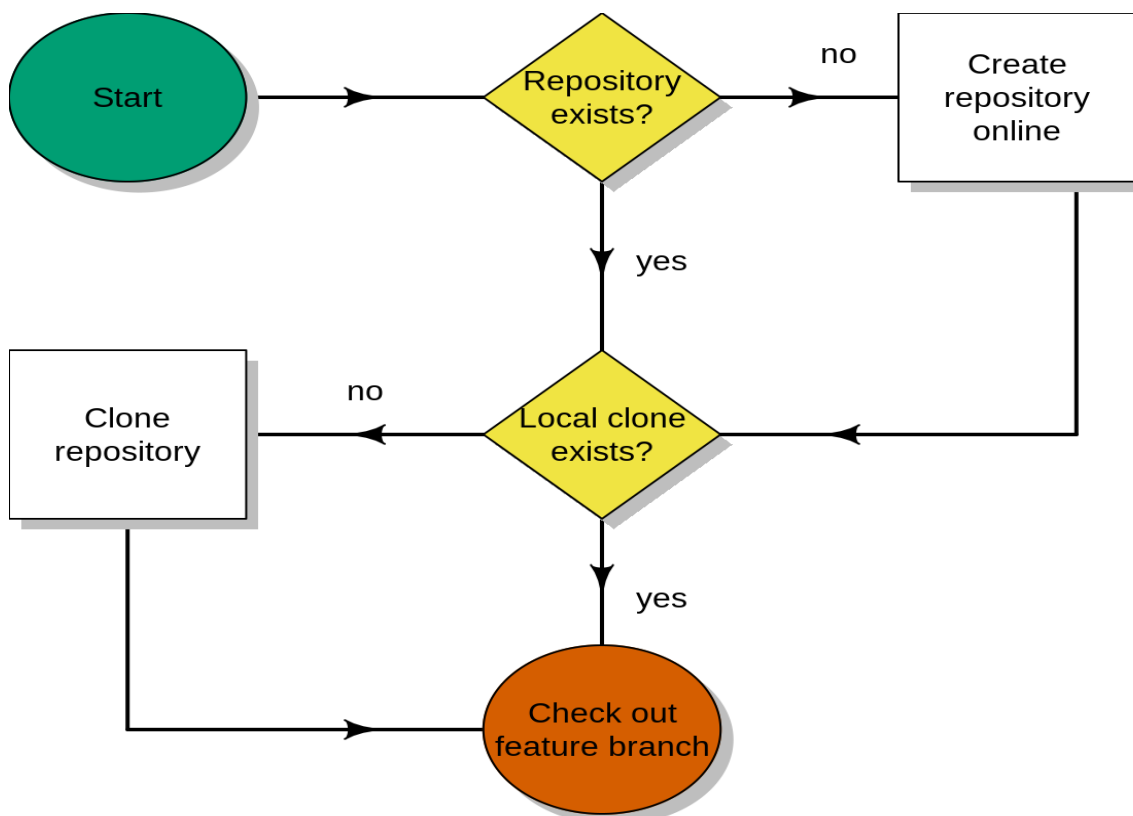
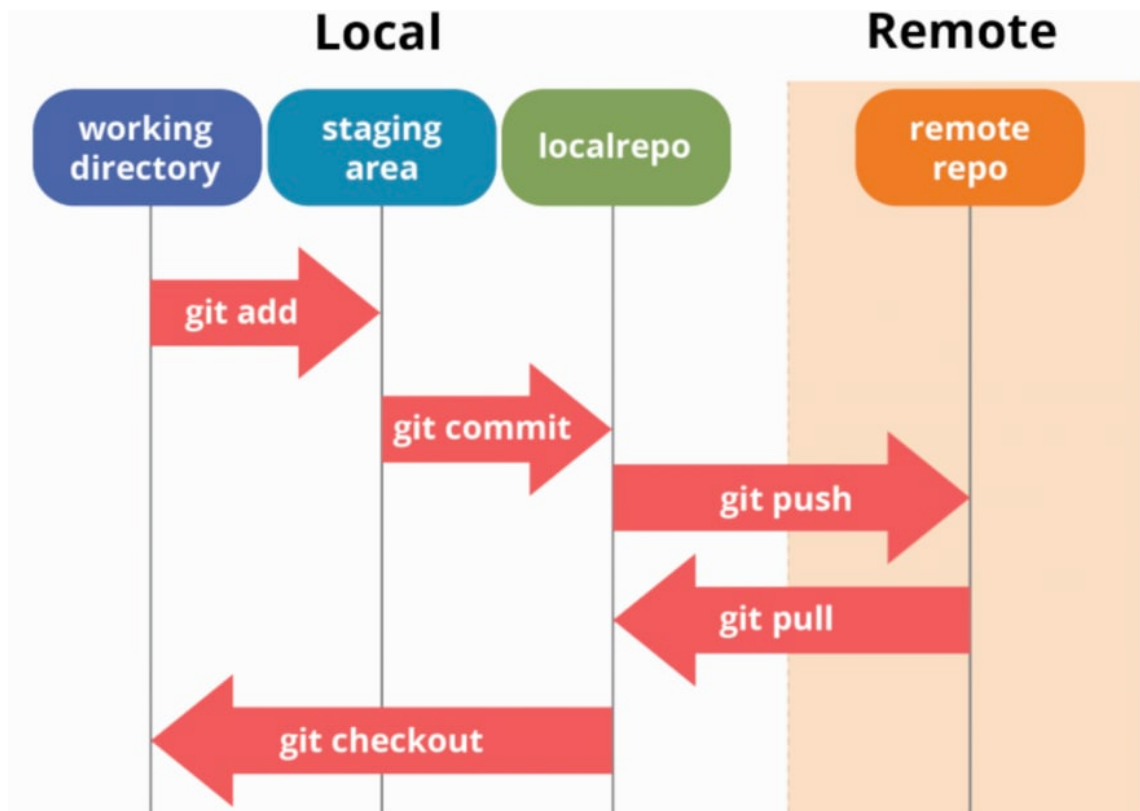
The central repository represents the official project, so its commit history should be treated as sacred and immutable. If a developer's local commits diverge from the central repository, Git will refuse to push their changes because this would overwrite official commits.



Before the developer can publish their feature, they need to fetch the updated central commits and rebase their changes on top of them. This is like saying, “I want to add my changes to what everyone else has already done.”

If local changes directly conflict with upstream commits, Git will pause the rebasing process and give you a chance to manually resolve the conflicts. The nice thing about Git is that it uses the same `git status` and `git add` commands for both generating commits and resolving merge conflicts. This makes it easy for new developers to manage their own merges. Plus, if they get themselves into trouble, Git makes it very easy to abort the entire rebase and try again





```
Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git status
On branch registration
nothing to commit, working tree clean

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git remote add origin https://github.com/Agamjot-Singh03/SCM-Project.git
error: remote origin already exists.

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git remote -v
origin https://github.com/Agamjot-Singh03/SCM-Project.git (fetch)
origin https://github.com/Agamjot-Singh03/SCM-Project.git (push)

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git push -u origin master
error: src refspec master does not match any
error: failed to push some refs to 'https://github.com/Agamjot-Singh03/SCM-Project.git'

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git pull
There is no tracking information for the current branch.
Please specify which branch you want to merge with.
See git-pull(1) for details.

    git pull <remote> <branch>

If you wish to set tracking information for this branch you can do so with:

    git branch --set-upstream-to=origin/<branch> registration

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git pull https://github.com/Agamjot-Singh03/SCM-Project.git
From https://github.com/Agamjot-Singh03/SCM-Project
 * branch                HEAD      -> FETCH_HEAD
Already up to date.

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git push -u origin master
error: src refspec master does not match any
error: failed to push some refs to 'https://github.com/Agamjot-Singh03/SCM-Project.git'

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$ git push -u origin registration
Enumerating objects: 14, done.
Counting objects: 100% (14/14), done.
Delta compression using up to 16 threads
Compressing objects: 100% (12/12), done.
Writing objects: 100% (12/12), 4.83 KiB | 2.42 MiB/s, done.
Total 12 (delta 8), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (8/8), completed with 1 local object.
remote:
remote: Create a pull request for 'registration' on GitHub by visiting:
remote:   https://github.com/Agamjot-Singh03/SCM-Project/pull/new/registration
remote:
To https://github.com/Agamjot-Singh03/SCM-Project.git
 * [new branch]      registration -> registration
branch 'registration' set up to track 'origin/registration'.

Agamjot Singh@LAPTOP-IREUPAFP MINGW64 ~/Desktop/SCM-Project (registration)
$
```

## Events

An event is a specific activity in a repository that triggers a workflow run. For example, activity can originate from GitHub when someone creates a pull request, opens an issue, or pushes a commit to a repository. You can also trigger a workflow run on a schedule, by posting to a REST API, or manually.

For a complete list of events that can be used to trigger workflows, see [Events that trigger workflows](#).

## NETWORK GRAPHS

The network graph is one of the useful features for developers on GitHub. It is used to display the branch history of the entire repository network, including branches of the root repository and branches of forks that contain commits unique to the network.

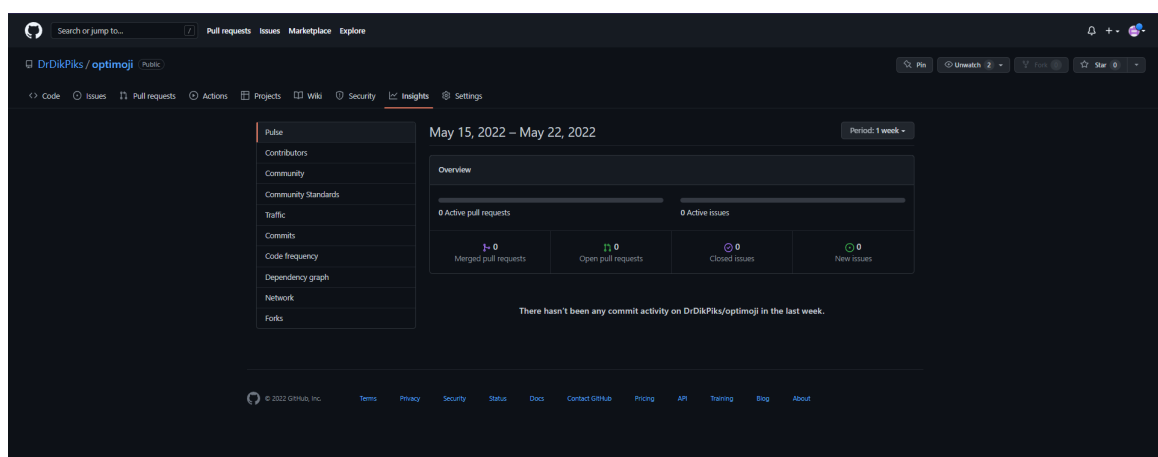
A repository's graphs give you information on traffic, projects that depend on the repository, contributors and commits to the repository, and a repository's forks and network. If you maintain a repository, you can use this data to get a better understanding of who's using your repository and why they're using it.

Some repository graphs are available only in public repositories with GitHub Free:

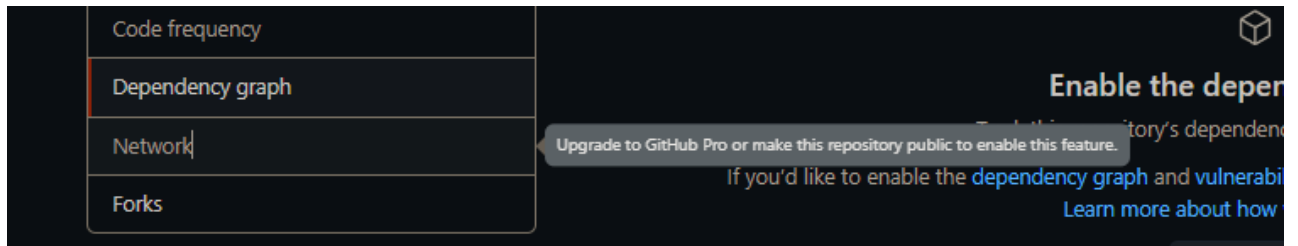
- Pulse
- Contributors
- Traffic
- Commits
- Code frequency
- Network

### Steps to access network graphs of respective repository

1. On GitHub.com, navigate to the main page of the repository.



2. Under your repository name, click Insights.



You will get the network graph of your repository which displays the branch history of the entire repository network, including branches of the root repository and branches of forks that contain commits unique to the network.

