Department of Information Technology

Academic Year: 2019-20 **Semester: VIII**
Class / Branch: BE IT
Subject: DevOps Lab (DL)
Subject Lab Incharge: Prof. Vishal S. Badgujar

EXPERIMENT NO. 01

Aim: To perform Version Control using GIT

Theory:

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. Git is easy to learn and has a tiny footprint with lightning fast performance. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like cheap local branching, convenient staging areas, and multiple workflows.

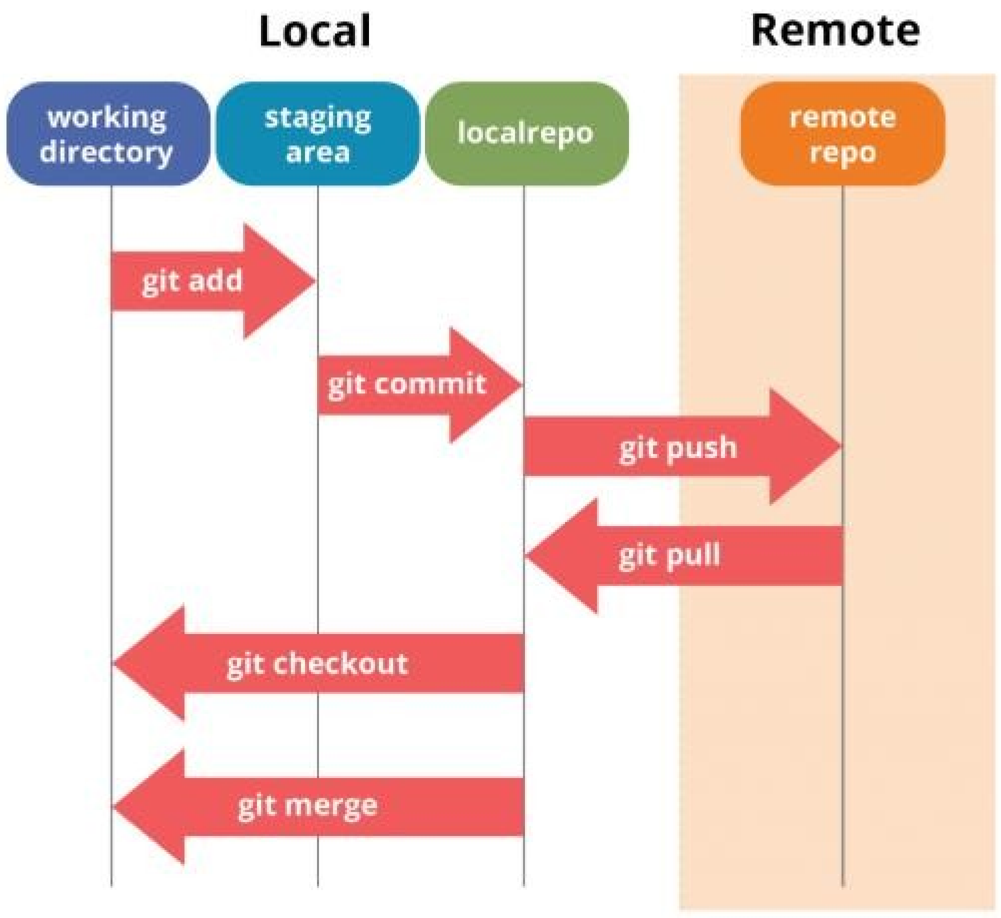
Some of the basic operations in Git are:

1. Initialize
2. Add
3. Commit
4. Pull
5. Push

Some advanced Git operations are:

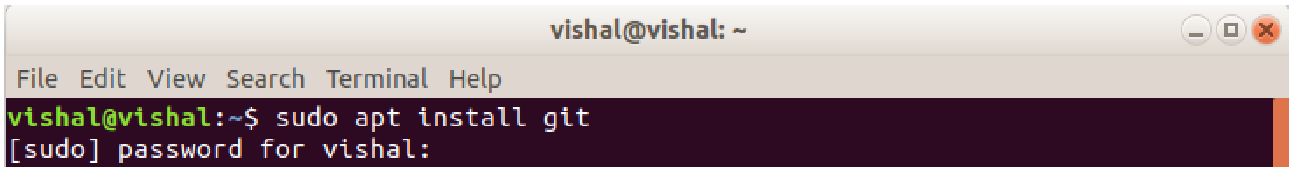
1. Branching
2. Merging
3. Rebasing

The following diagram depict the all supported operations in GIT

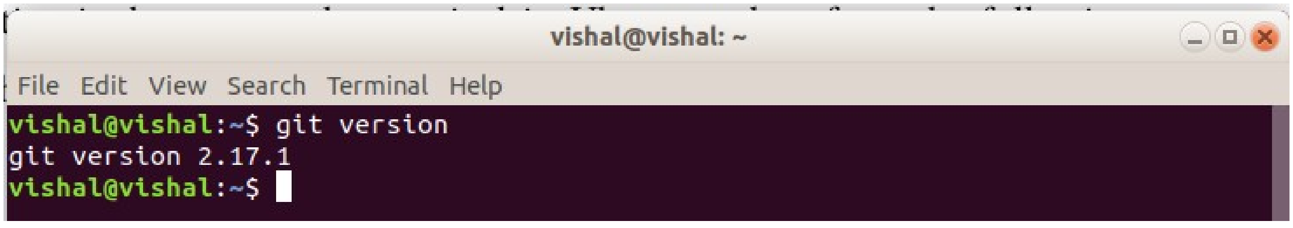


Installation of GIT

1) In Ubuntu, install GIT using $sudo apt install git, and then Confirm the version after installation using command $git version



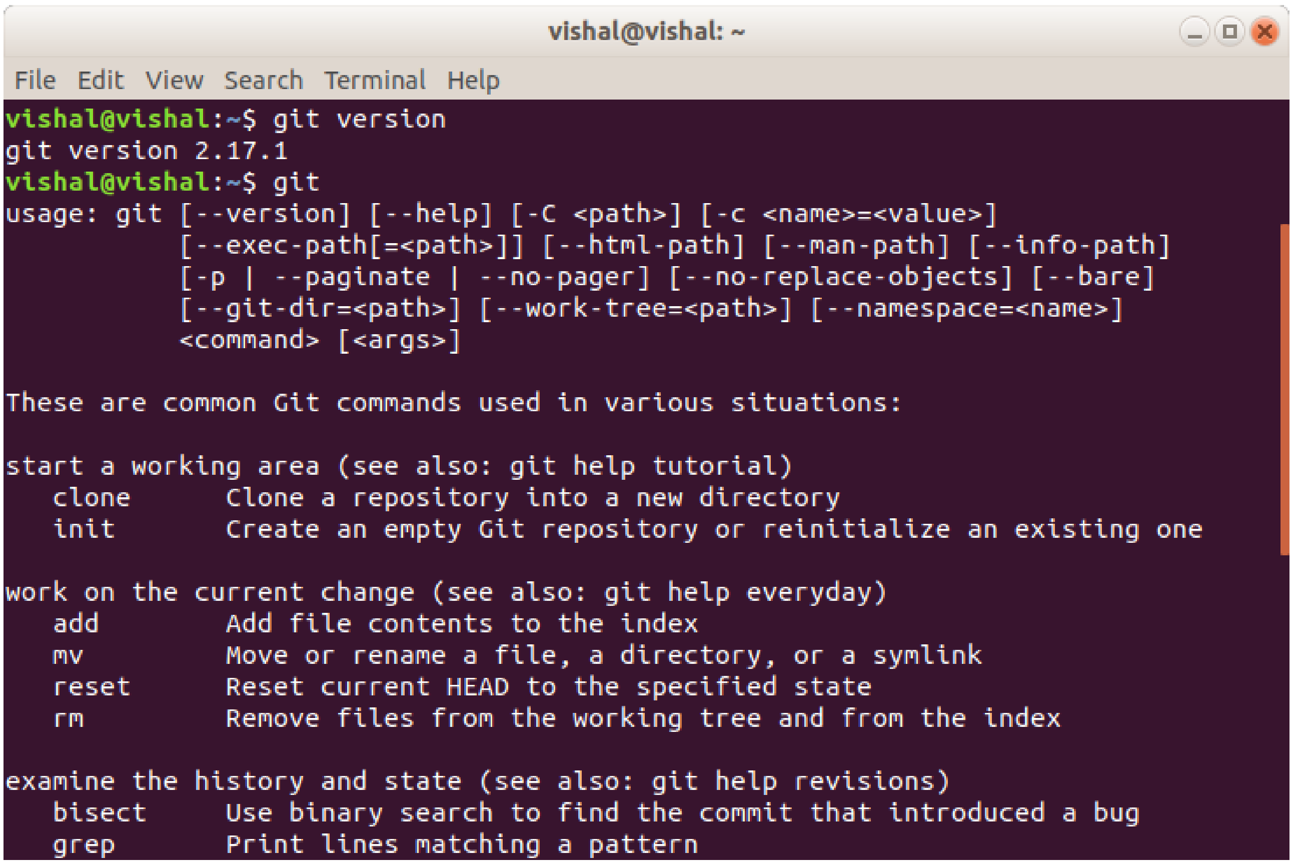
```
vishal@vishal:~$ sudo apt install git
[sudo] password for vishal:
```



```
vishal@vishal:~$ git version
git version 2.17.1
vishal@vishal:~$ 
```

Once installation is done, open the terminal in Ubuntu and perform the following steps

The output of GIT shell in Ubuntu is shown below



```
vishal@vishal:~$ git version
git version 2.17.1
vishal@vishal:~$ git
usage: git [--version] [--help] [-C <path>] [-c <name>=<value>]
           [--exec-path[=<path>]] [--html-path] [--man-path] [--info-path]
           [-p | --paginate | --no-pager] [--no-replace-objects] [--bare]
           [--git-dir=<path>] [--work-tree=<path>] [--namespace=<name>]
           <command> [<args>]

These are common Git commands used in various situations:

start a working area (see also: git help tutorial)
   clone      Clone a repository into a new directory
   init       Create an empty Git repository or reinitialize an existing one

work on the current change (see also: git help everyday)
   add        Add file contents to the index
   mv         Move or rename a file, a directory, or a symlink
   reset      Reset current HEAD to the specified state
   rm         Remove files from the working tree and from the index

examine the history and state (see also: git help revisions)
   bisect     Use binary search to find the commit that introduced a bug
   grep       Print lines matching a pattern
```

To perform version control, let us create a directory dvcs (Distributed version control system) and change directory to dvcs.

vishal@vishal:~$ mkdir git-dvcs

vishal@vishal:~$ cd git-dvcs/

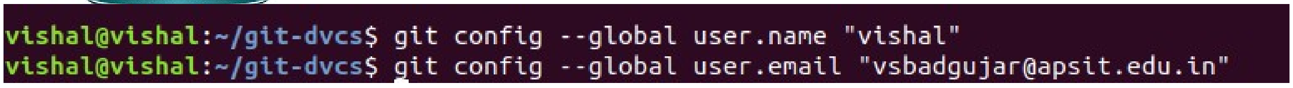
Now check the user information using

vishal@vishal:~/git-dvcs$ git config --global

As there are no users defined, let us define it using following two commands

vishal@vishal:~/git-dvcs$ git config --global user.name "vishal"

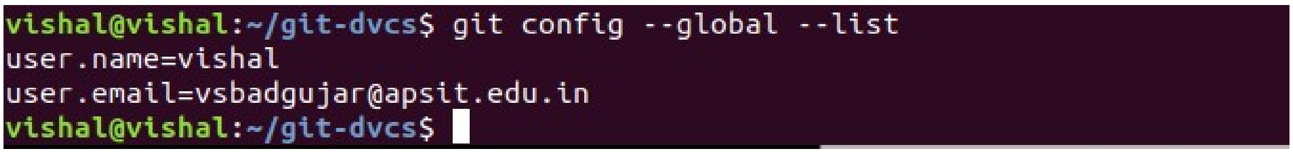
vishal@vishal:~/git-dvcs$ git config --global user.email "vsbadgujar@apsit.edu.in"



```
vishal@vishal:~/git-dvcs$ git config --global user.name "vishal"
vishal@vishal:~/git-dvcs$ git config --global user.email "vsbadgujar@apsit.edu.in"
```

Now, check the list of users

vishal@vishal:~/git-dvcs$ git config --global –list



```
vishal@vishal:~/git-dvcs$ git config --global --list
user.name=vishal
user.email=vsbadgujar@apsit.edu.in
vishal@vishal:~/git-dvcs$
```

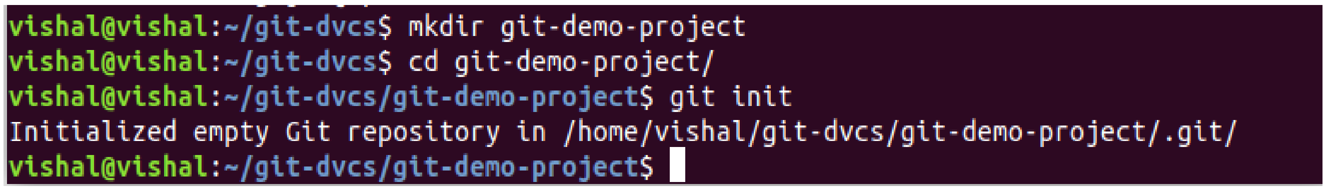
Let us create a repository for version control named “git-demo-project”

vishal@vishal:~/git-dvcs$ mkdir git-demo-project

vishal@vishal:~/git-dvcs$ cd git-demo-project/

Now, initialize the repository using following command

vishal@vishal:~/git-dvcs$ git init



```
vishal@vishal:~/git-dvcs$ mkdir git-demo-project
vishal@vishal:~/git-dvcs$ cd git-demo-project/
vishal@vishal:~/git-dvcs/git-demo-project$ git init
Initialized empty Git repository in /home/vishal/git-dvcs/git-demo-project/.git/
vishal@vishal:~/git-dvcs/git-demo-project$
```

The output of above command shown below which adds .git hidden directory in current repository.

Add some files inside our repository “ git-demo-project”

To add files in the repository by create or copy some doc,html,image files inside current directory to see index and staging area.

The add command is used along with dot (. Dot means current directory) for adding files in current repository i.e. making them in staging mode. They are untracked until we commit them.

vishal@vishal:~/git-dvcs/git-demo-project$ git add .

Index and staging area

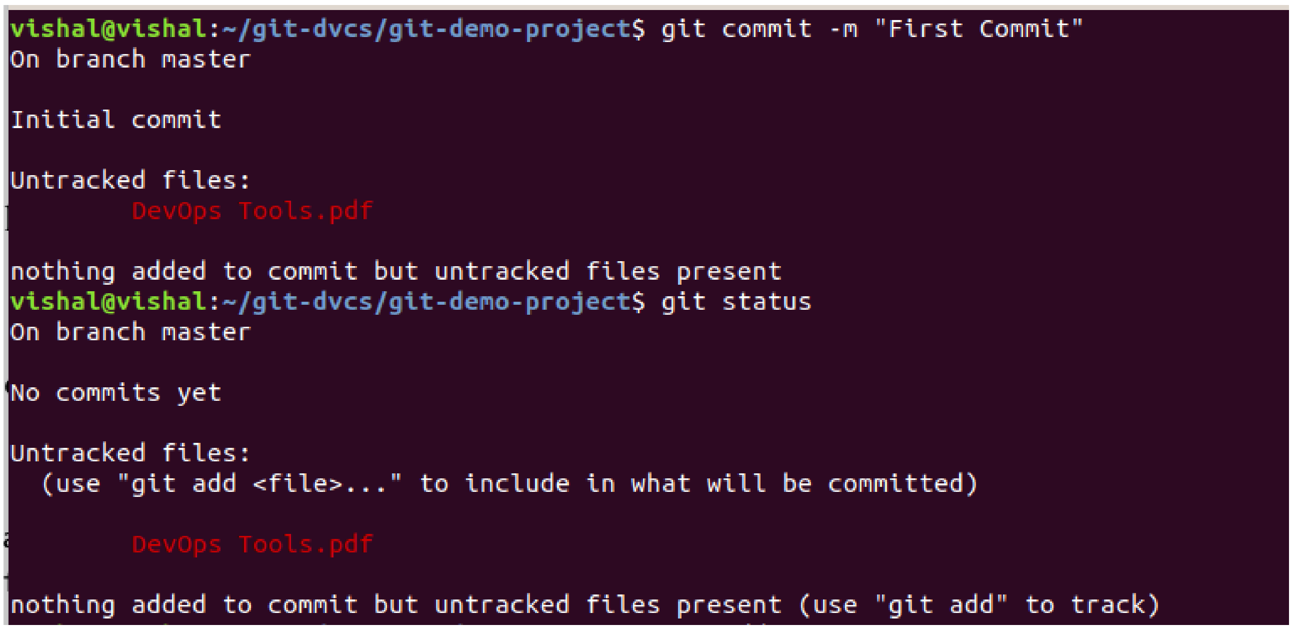
To check the status of repository, use

vishal@vishal:~/git-dvcs/git-demo-project$ git status

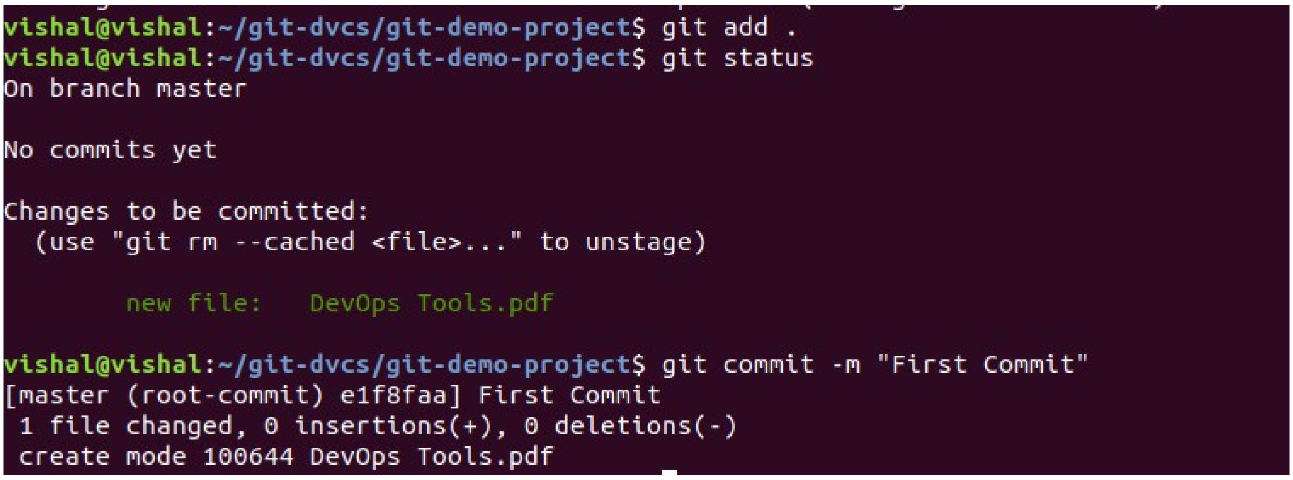
Which will show you some untrack files, so untracks files can be tracked using commit command.

Now, let us commit the changes

vishal@vishal:~/git-dvcs/git-demo-project$ git commit -m "First Commit" (#here -m for message)



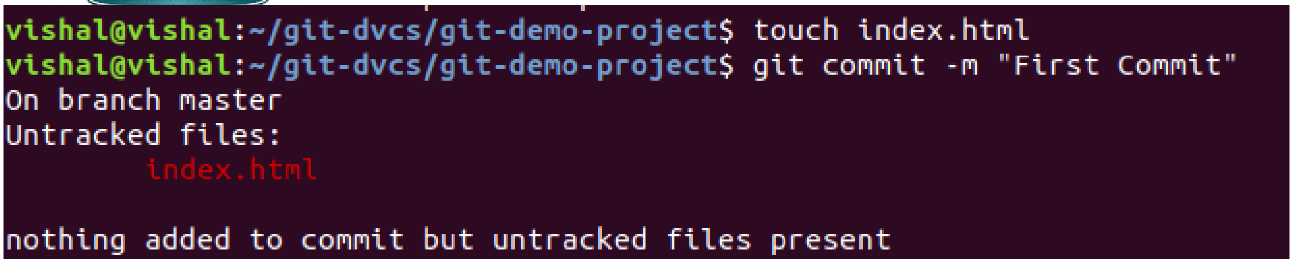
```
vishal@vishal:~/git-dvcs/git-demo-project$ git commit -m "First Commit"
On branch master

Initial commit

Untracked files:
        DevOps Tools.pdf

nothing added to commit but untracked files present
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master

No commits yet

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

        DevOps Tools.pdf

nothing added to commit but untracked files present (use "git add" to track)
```



```
vishal@vishal:~/git-dvcs/git-demo-project$ git add .
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master

No commits yet

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

        new file:   DevOps Tools.pdf

vishal@vishal:~/git-dvcs/git-demo-project$ git commit -m "First Commit"
[master (root-commit) e1f8faa] First Commit
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 DevOps Tools.pdf
```

Add index.html in our directory by using command

vishal@vishal:~/git-dvcs/git-demo-project$touch index.html



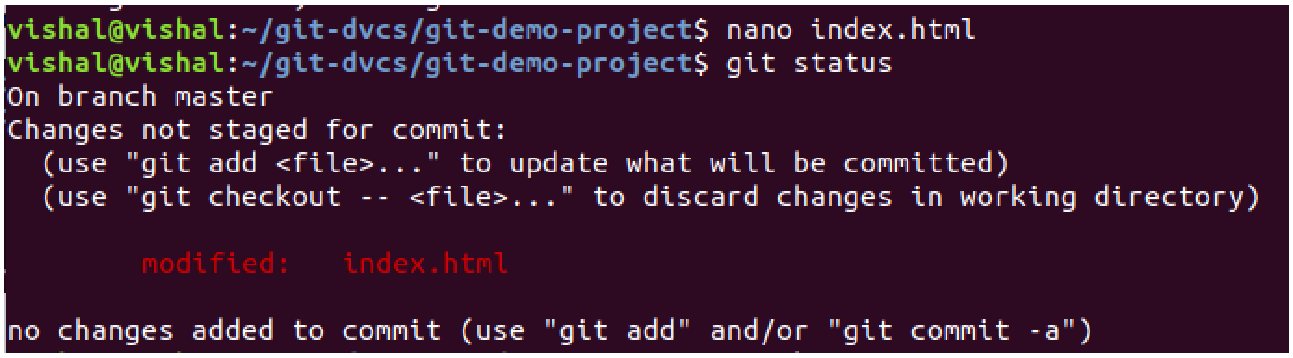
```
vishal@vishal:~/git-dvcs/git-demo-project$ touch index.html
vishal@vishal:~/git-dvcs/git-demo-project$ git commit -m "First Commit"
On branch master
Untracked files:
        index.html

nothing added to commit but untracked files present
```

vishal@vishal:~/git-dvcs/git-demo-project$ git add .

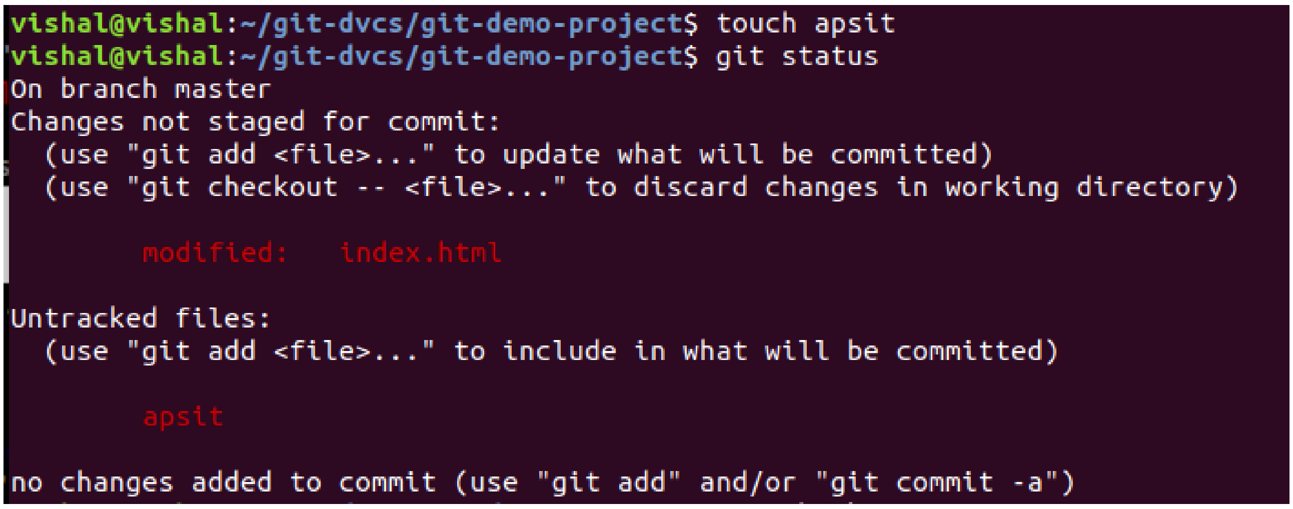
vishal@vishal:~/git-dvcs/git-demo-project$git commit -am "express Commit" (#Here -a used for express commit)

vishal@vishal:~/git-dvcs/git-demo-project$ nano index.html

put any text in index html and save file by ctrl+o for save and ctrl+x for exit



```
vishal@vishal:~/git-dvcs/git-demo-project$ nano index.html
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

        modified:   index.html

no changes added to commit (use "git add" and/or "git commit -a")
```



```
vishal@vishal:~/git-dvcs/git-demo-project$ touch apsit
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

        modified:   index.html

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

        apsit

no changes added to commit (use "git add" and/or "git commit -a")
```

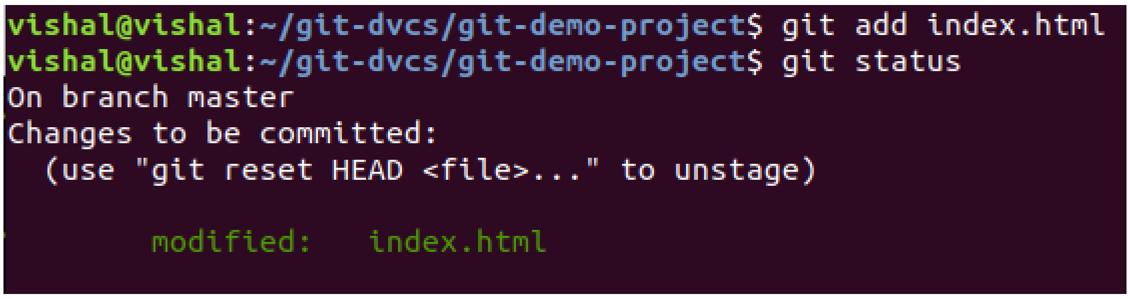
Changes are Discarded by checkout

(use "git add <file>..." to update what will be committed)

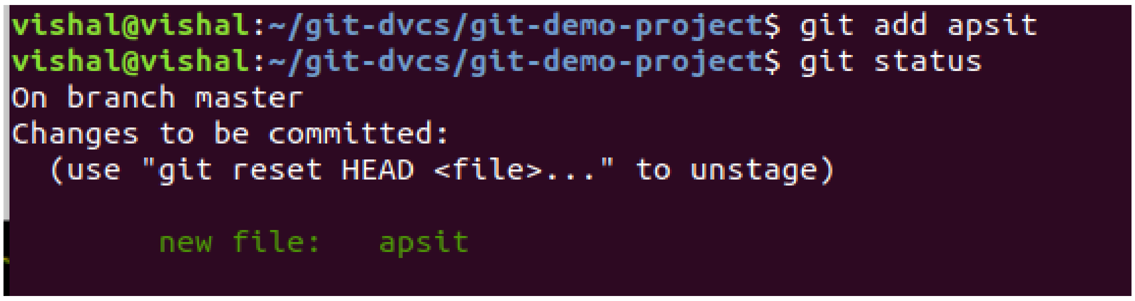
(use "git restore <file>..." to discard changes in working directory)

vishal@vishal:~/git-dvcs/git-demo-project$ git add index.html

vishal@vishal:~/git-dvcs/git-demo-project$ git add apsit

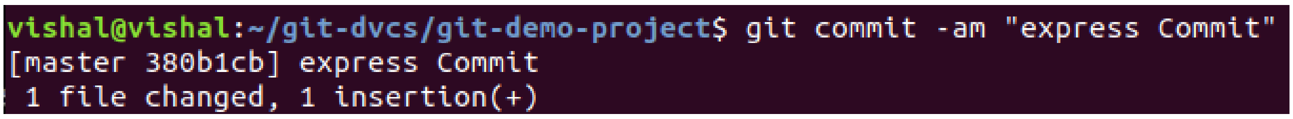


```
vishal@vishal:~/git-dvcs/git-demo-project$ git add index.html
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

        modified:   index.html
```

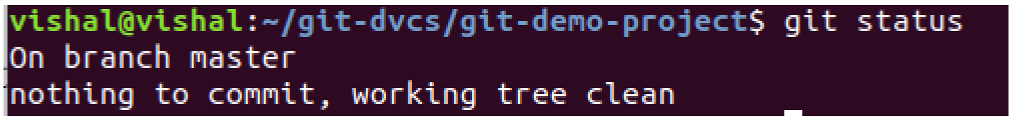


```
vishal@vishal:~/git-dvcs/git-demo-project$ git add apsit
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

        new file:   apsit
```

vishal@vishal:~/git-dvcs/git-demo-project$ git commit -am "Express commit"



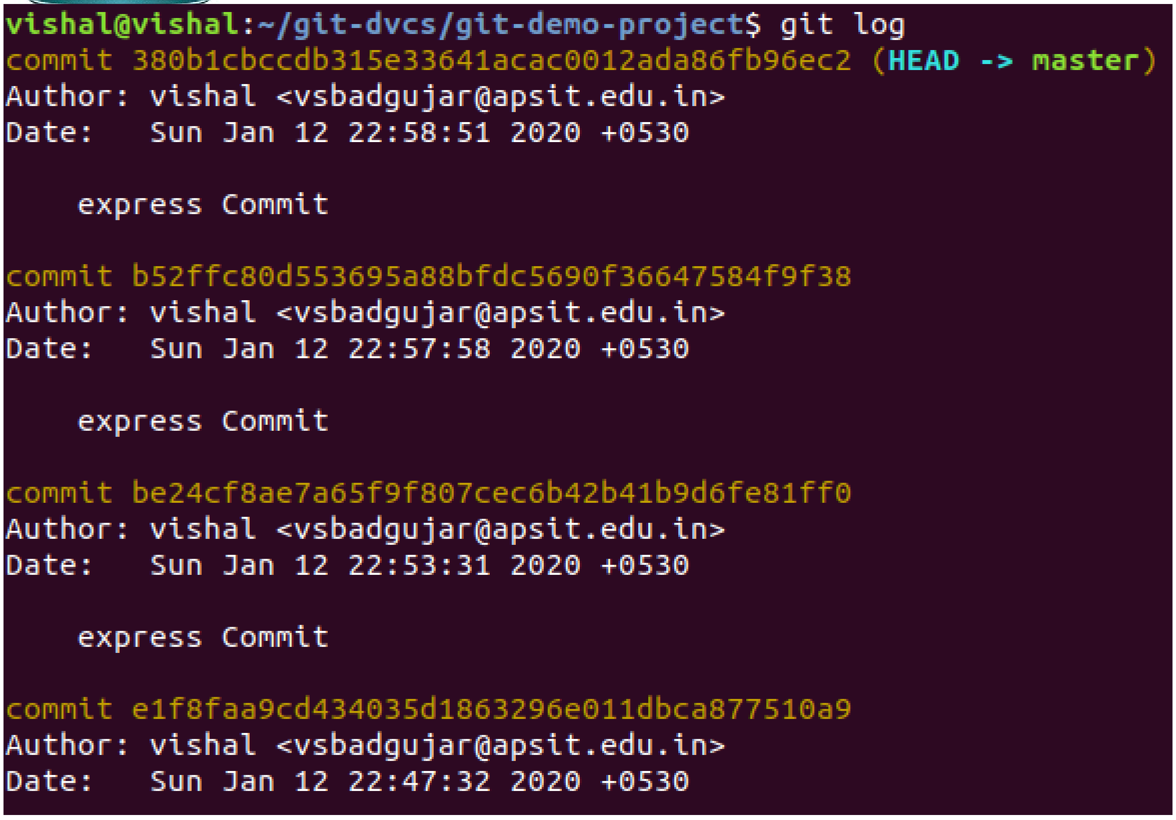
```
vishal@vishal:~/git-dvcs/git-demo-project$ git commit -am "express Commit"
[master 380b1cb] express Commit
 1 file changed, 1 insertion(+)
```



```
vishal@vishal:~/git-dvcs/git-demo-project$ git status
On branch master
nothing to commit, working tree clean
```

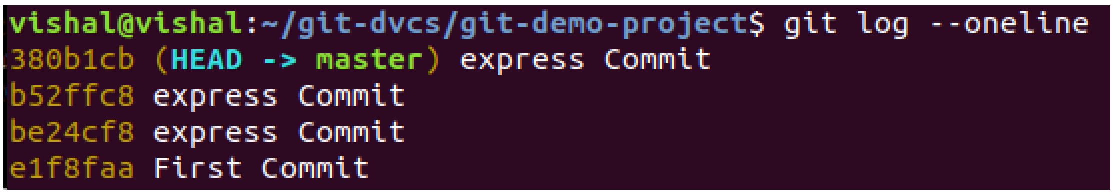
Now let us see history of commits. The log command is used for seeing the commit history.

vishal@vishal:~/git-dvcs/git-demo-project$ git log



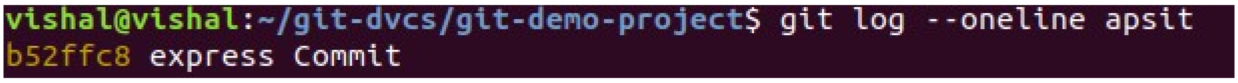
```
vishal@vishal:~/git-dvcs/git-demo-project$ git log
commit 380b1cbccdb315e33641acac0012ada86fb96ec2 (HEAD -> master)
Author: vishal <vsbadgujar@apsit.edu.in>
Date:   Sun Jan 12 22:58:51 2020 +0530

    express Commit

commit b52ffc80d553695a88bfdc5690f36647584f9f38
Author: vishal <vsbadgujar@apsit.edu.in>
Date:   Sun Jan 12 22:57:58 2020 +0530

    express Commit

commit be24cf8ae7a65f9f807cec6b42b41b9d6fe81ff0
Author: vishal <vsbadgujar@apsit.edu.in>
Date:   Sun Jan 12 22:53:31 2020 +0530

    express Commit

commit e1f8faa9cd434035d1863296e011dbca877510a9
Author: vishal <vsbadgujar@apsit.edu.in>
Date:   Sun Jan 12 22:47:32 2020 +0530
```

To see all the operation in oneline use the –-oneline option in log command

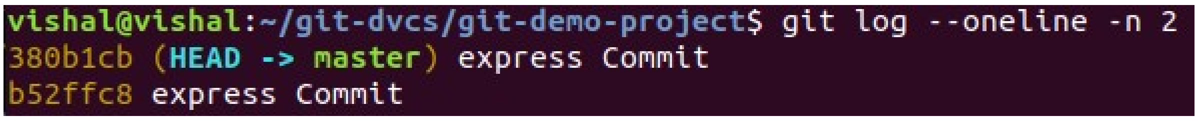


```
vishal@vishal:~/git-dvcs/git-demo-project$ git log --oneline
380b1cb (HEAD -> master) express Commit
b52ffc8 express Commit
be24cf8 express Commit
e1f8faa First Commit
```

--oneline option for particular file in log command



```
vishal@vishal:~/git-dvcs/git-demo-project$ git log --oneline apsit
b52ffc8 express Commit
```

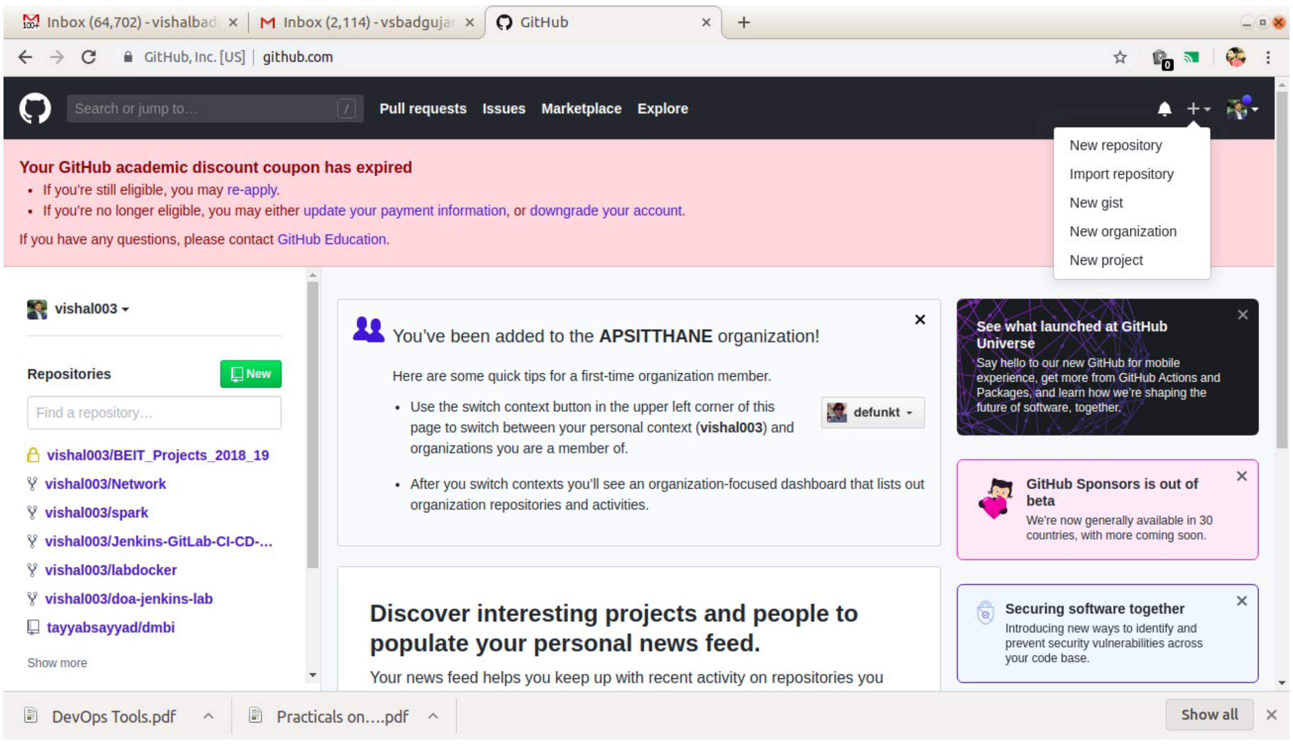


```
vishal@vishal:~/git-dvcs/git-demo-project$ git log --oneline -n 2
380b1cb (HEAD -> master) express Commit
b52ffc8 express Commit
```

Example 2: Performing Version control in GITHUB with Pull and Push commands.

First open Github.com and create a new account.After verifying account through E-mail, create a Repository on github.com.

Open github.com → create an account → After login Select New repository from the menu.



Your GitHub academic discount coupon has expired

- If you're still eligible, you may re-apply.
- If you're no longer eligible, you may either update your payment information, or downgrade your account.

If you have any questions, please contact GitHub Education.

You've been added to the APSITTHANE organization!

Here are some quick tips for a first-time organization member.

- Use the switch context button in the upper left corner of this page to switch between your personal context (vishal003) and organizations you are a member of.
- After you switch contexts you'll see an organization-focused dashboard that lists out organization repositories and activities.

Discover interesting projects and people to populate your personal news feed.

Your news feed helps you keep up with recent activity on repositories you

See what launched at GitHub Universe

Say hello to our new GitHub for mobile experience, get more from GitHub Actions and Packages, and learn how we're shaping the future of software, together.

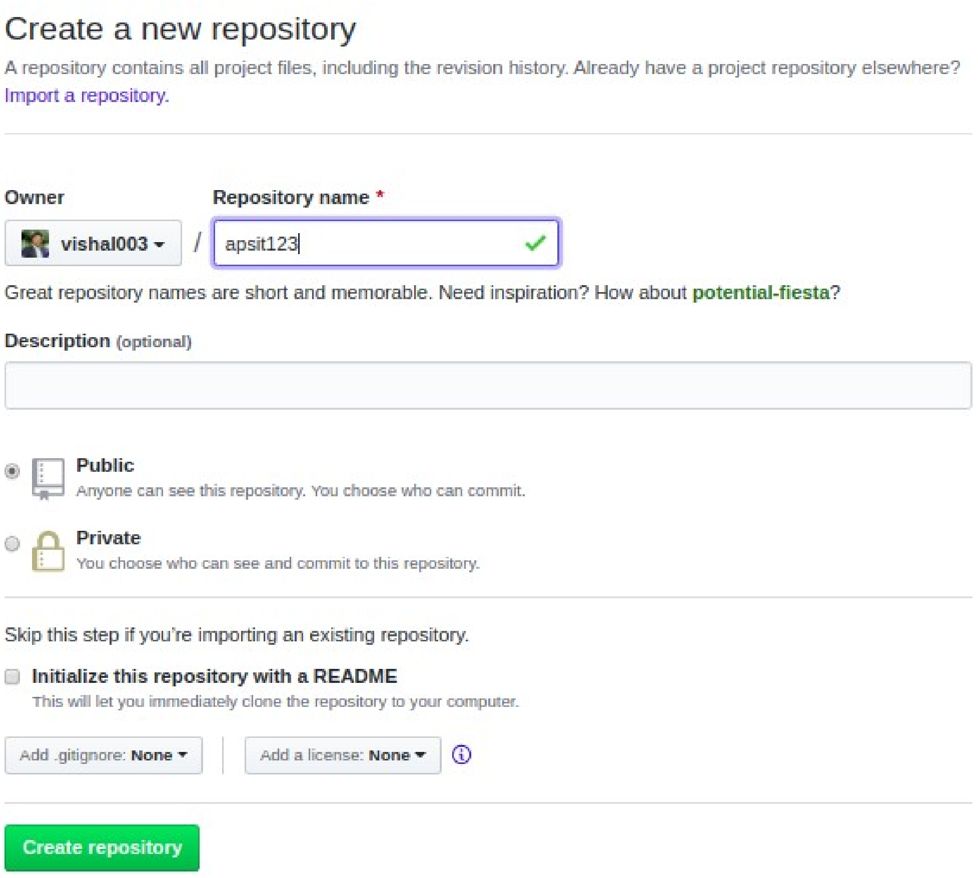
GitHub Sponsors is out of beta

We're now generally available in 30 countries, with more coming soon.

Securing software together

Introducing new ways to identify and prevent security vulnerabilities across your code base.

Specify a Name to repository and select public option followed by 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: vishal003 / Repository name *: apsit123

Great repository names are short and memorable. Need inspiration? How about potential-fiesta?

Description (optional)

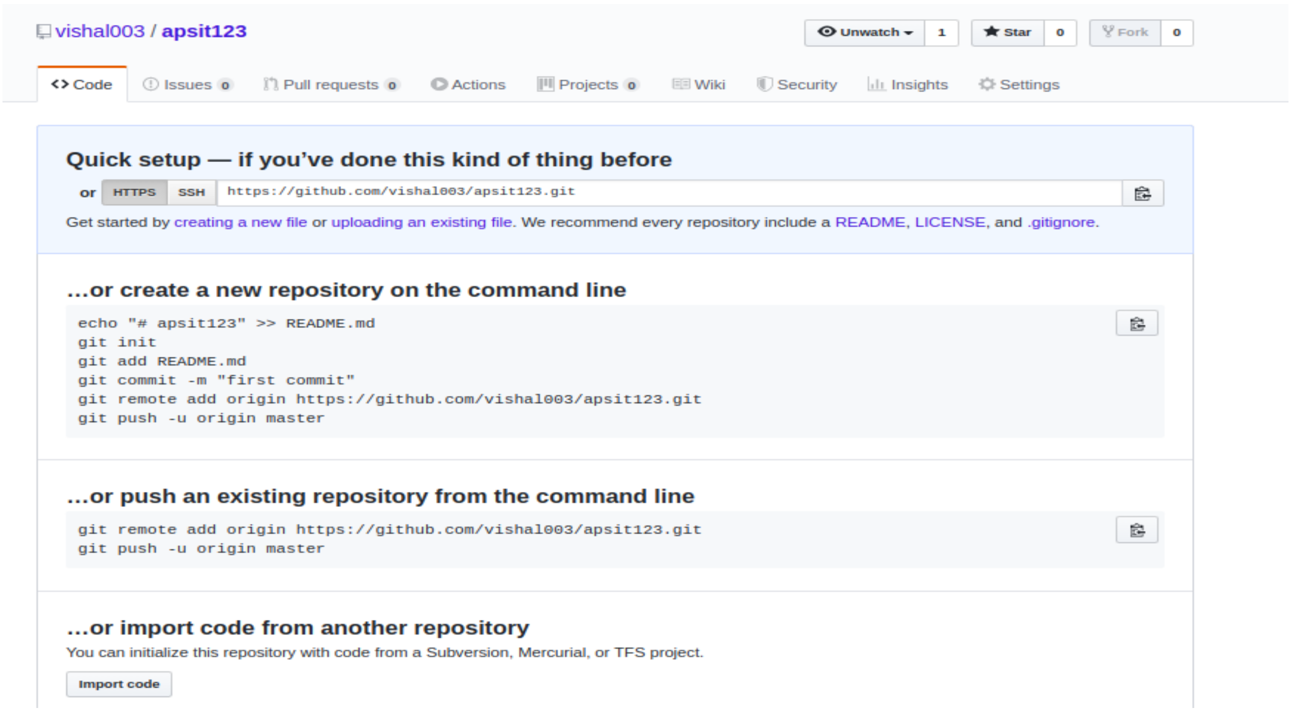
● Public — Anyone can see this repository. You choose who can commit.

○ Private — You choose who can see and commit to this repository.

Skip this step if you're importing an existing repository.

☐ Initialize this repository with a README — This will let you immediately clone the repository to your computer.

Add .gitignore: None | Add a license: None



Quick setup — if you've done this kind of thing before

or HTTPS SSH https://github.com/vishal003/apsit123.git

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

…or create a new repository on the command line

```
echo "# apsit123" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin https://github.com/vishal003/apsit123.git
git push -u origin master
```

…or push an existing repository from the command line

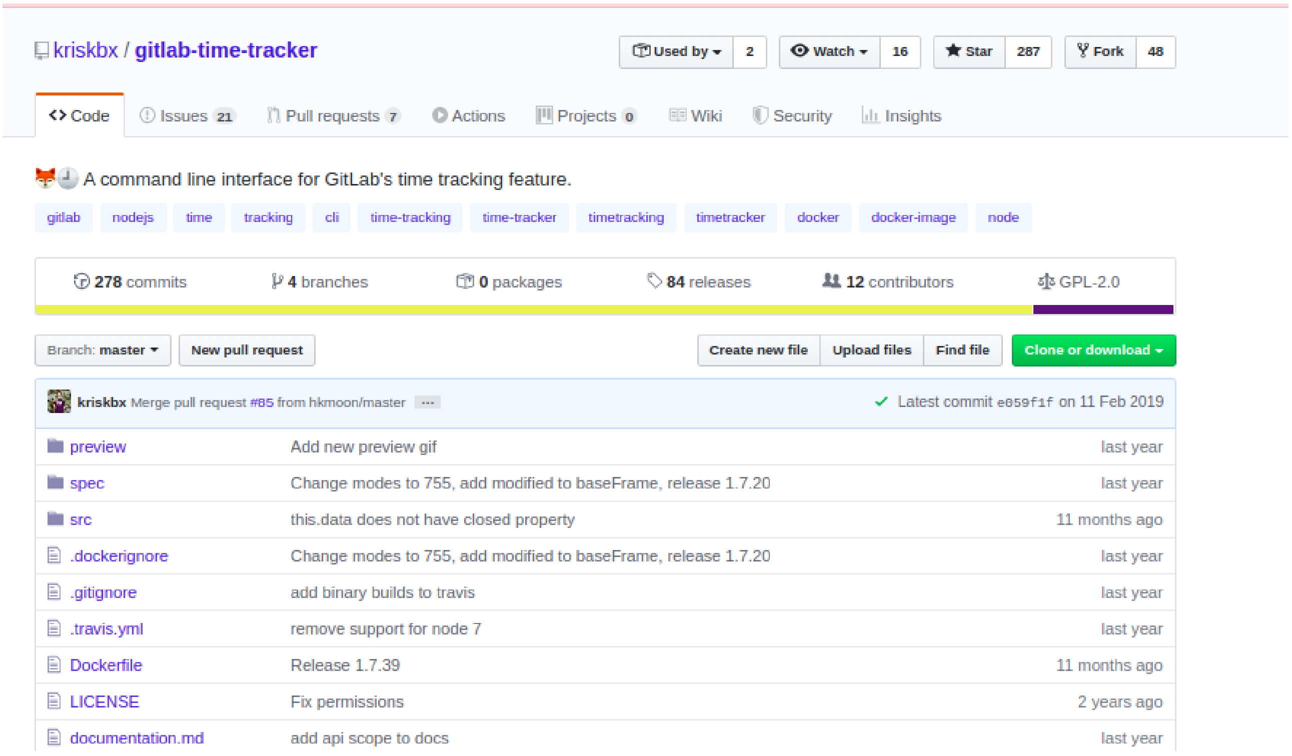
```
git remote add origin https://github.com/vishal003/apsit123.git
git push -u origin master
```

…or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

By default, we can create public repository in Github. So we can copy the entire public repository of any other users in to own account using "FORK" Operation. Now fork the repository (Sharing with other users who wants to contribute).

Login with another account → Copy and Paste URL of repository → then just click on fork to clone to others account. Suppose we want to fork public repository "timetracker". So search for "timetracker" github repository on google and once its opened clicked on "Fork button" from the top of the github web page as shown below.



kriskbx / gitlab-time-tracker

Used by 2 | Watch 16 | Star 287 | Fork 48

Code | Issues 21 | Pull requests 7 | Actions | Projects 0 | Wiki | Security | Insights

A command line interface for GitLab's time tracking feature.

gitlab nodejs time tracking cli time-tracking time-tracker timetracking timetracker docker docker-image node

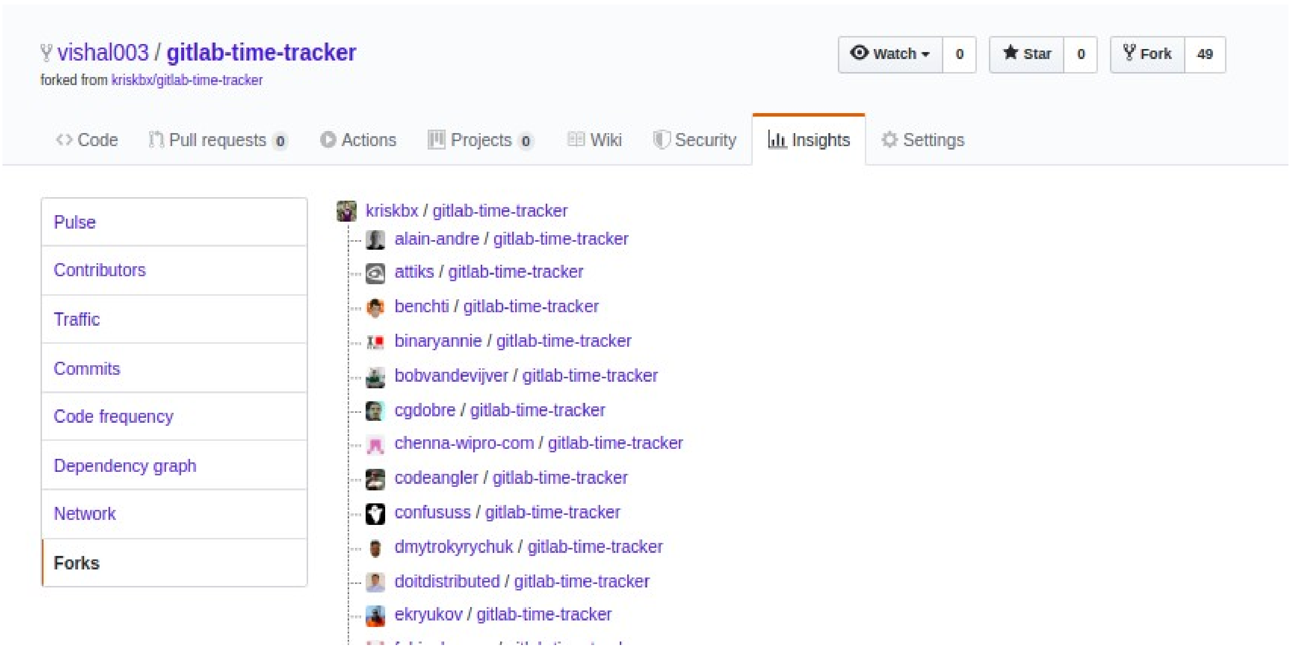
278 commits | 4 branches | 0 packages | 84 releases | 12 contributors | GPL-2.0

Branch: master | New pull request | Create new file | Upload files | Find file | Clone or download

kriskbx Merge pull request #85 from hkmoon/master ... ✓ Latest commit e059f1f on 11 Feb 2019

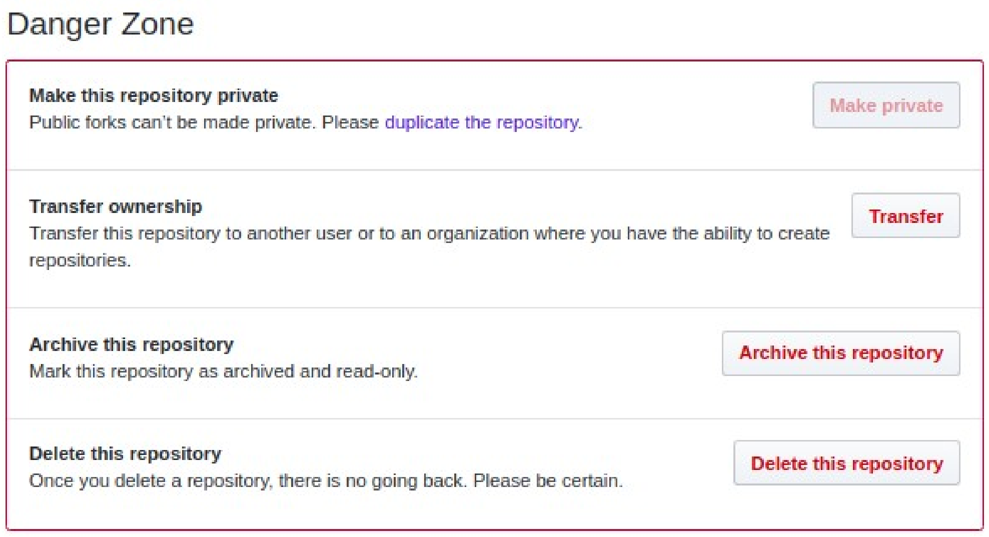
preview	Add new preview gif	last year
spec	Change modes to 755, add modified to baseFrame, release 1.7.20	last year
src	this.data does not have closed property	11 months ago
.dockerignore	Change modes to 755, add modified to baseFrame, release 1.7.20	last year
.gitignore	add binary builds to travis	last year
.travis.yml	remove support for node 7	last year
Dockerfile	Release 1.7.39	11 months ago
LICENSE	Fix permissions	2 years ago
documentation.md	add api scope to docs	last year

After fork it will be added in your local repository.


vishal003 / gitlab-time-tracker
forked from kriskbx/gitlab-time-tracker

kriskbx / gitlab-time-tracker
alain-andre / gitlab-time-tracker
attiks / gitlab-time-tracker
benchti / gitlab-time-tracker
binaryannie / gitlab-time-tracker
bobvandevijver / gitlab-time-tracker
cgdobre / gitlab-time-tracker
chenna-wipro-com / gitlab-time-tracker
codeangler / gitlab-time-tracker
confususs / gitlab-time-tracker
dmytrokyrychuk / gitlab-time-tracker
doitdistributed / gitlab-time-tracker
ekryukov / gitlab-time-tracker

To delete the repository, open the desired repository you want to delete and go to the settings option. There you will see delete repository button to delete it.

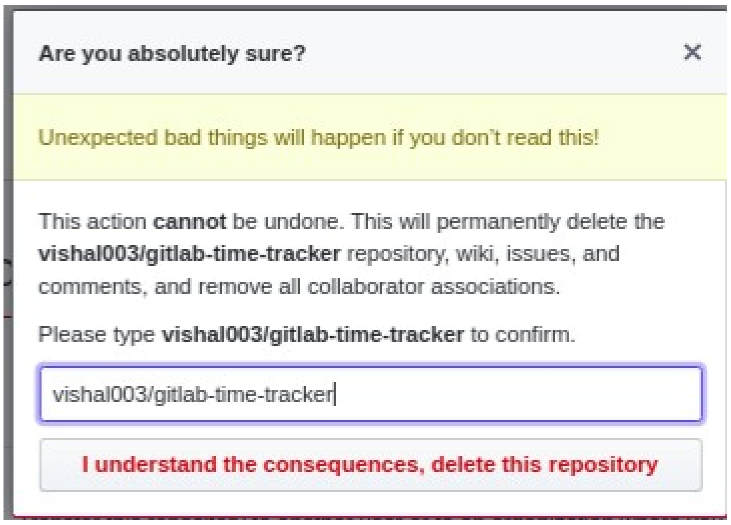

Danger Zone

Make this repository private
Public forks can't be made private. Please duplicate the repository.

Transfer ownership
Transfer this repository to another user or to an organization where you have the ability to create repositories.

Archive this repository
Mark this repository as archived and read-only.

Delete this repository
Once you delete a repository, there is no going back. Please be certain.



Are you absolutely sure?

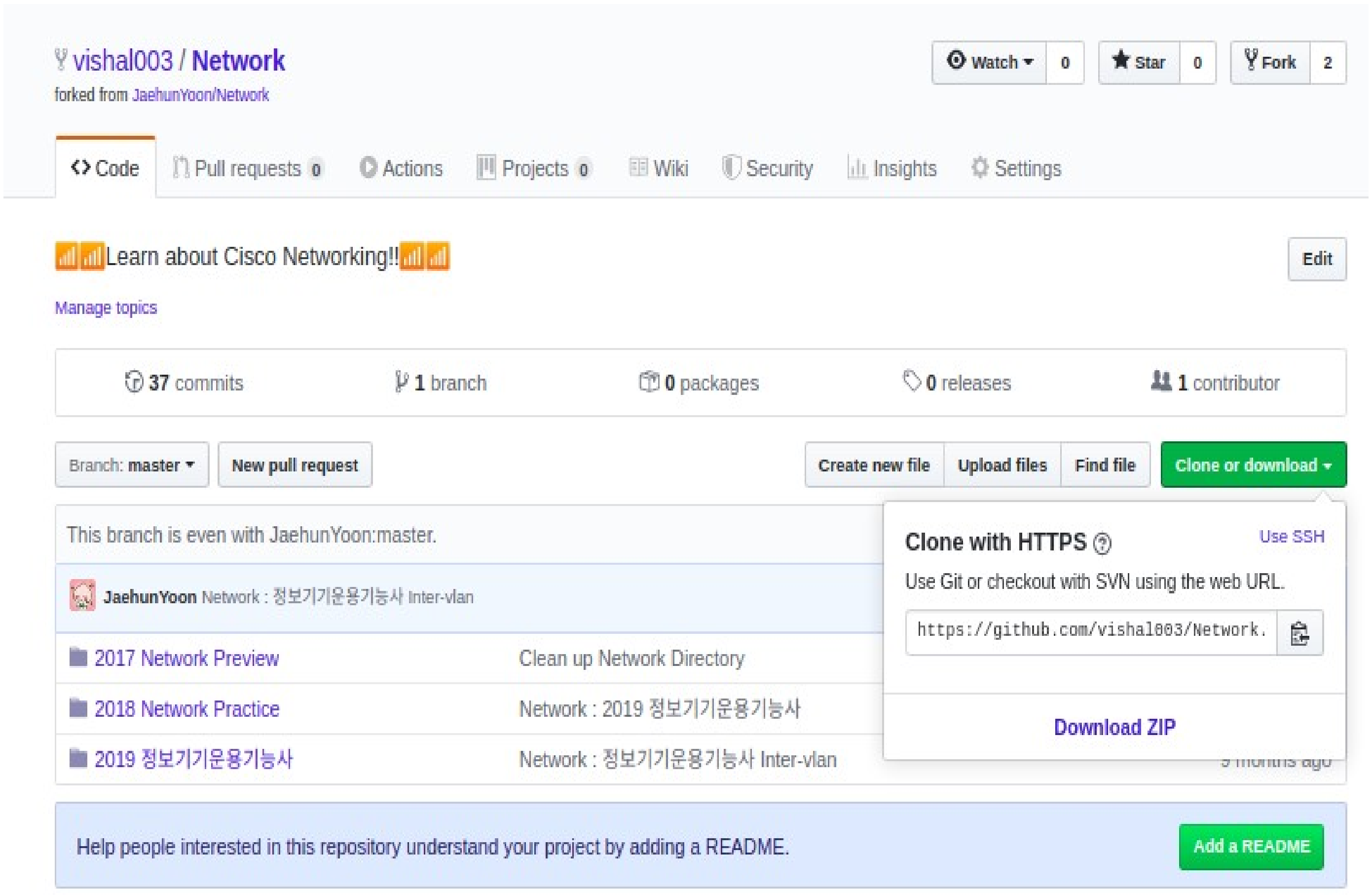
Unexpected bad things will happen if you don't read this!

This action **cannot** be undone. This will permanently delete the **vishal003/gitlab-time-tracker** repository, wiki, issues, and comments, and remove all collaborator associations.

Please type **vishal003/gitlab-time-tracker** to confirm.

vishal003/gitlab-time-tracker

if you want to download a repository in local machine, then git clone command is used followed by path to repository. In GitHub the path of repository can be known through clone or download button and it can be downloaded using git clone command as shown below.



vishal003 / Network
forked from JaehunYoon/Network

Learn about Cisco Networking!!

This branch is even with JaehunYoon:master.

JaehunYoon Network : 정보기기운용기능사 Inter-vlan

2017 Network Preview	Clean up Network Directory
2018 Network Practice	Network : 2019 정보기기운용기능사
2019 정보기기운용기능사	Network : 정보기기운용기능사 Inter-vlan

Clone with HTTPS

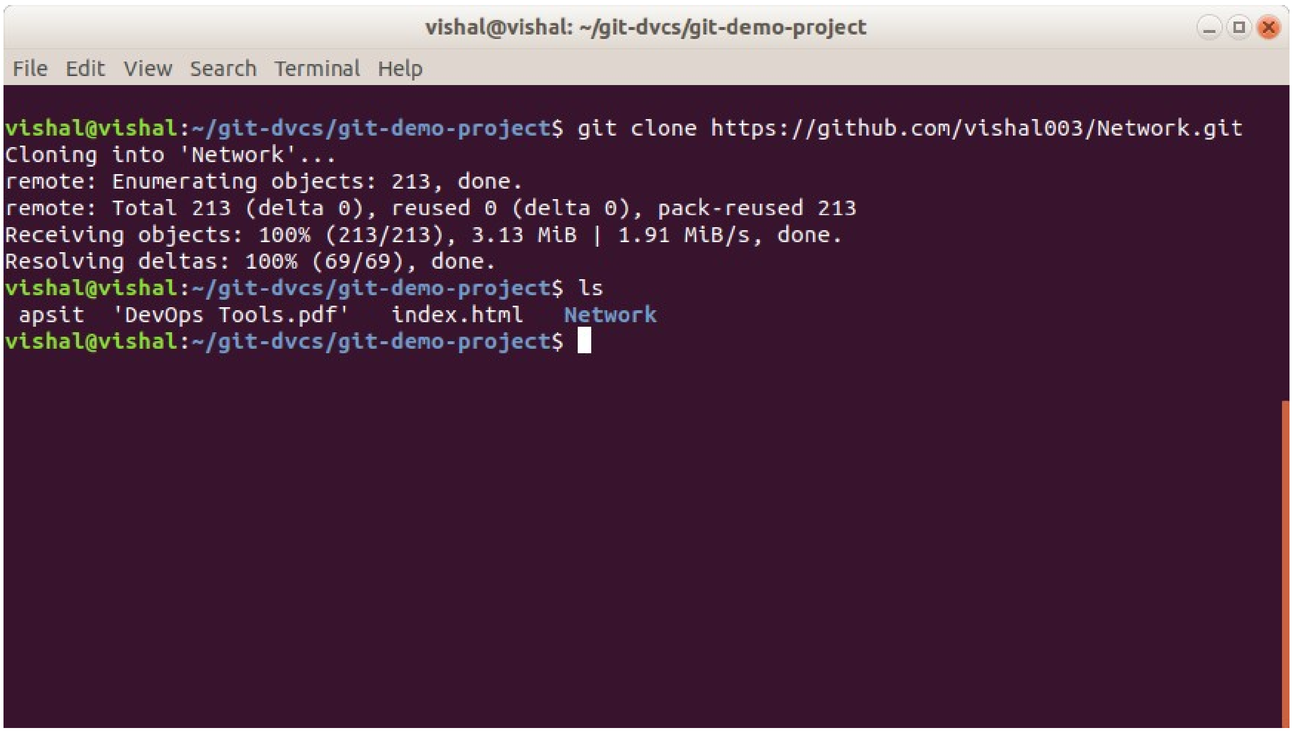
Use SSH

Use Git or checkout with SVN using the web URL.

```
https://github.com/vishal003/Network.
```

Help people interested in this repository understand your project by adding a README.

To clone repository into your git local repository :


vishal@vishal: ~/git-dvcs/git-demo-project
File Edit View Search Terminal Help

```
vishal@vishal:~/git-dvcs/git-demo-project$ git clone https://github.com/vishal003/Network.git
Cloning into 'Network'...
remote: Enumerating objects: 213, done.
remote: Total 213 (delta 0), reused 0 (delta 0), pack-reused 213
Receiving objects: 100% (213/213), 3.13 MiB | 1.91 MiB/s, done.
Resolving deltas: 100% (69/69), done.
vishal@vishal:~/git-dvcs/git-demo-project$ ls
 apsit  'DevOps Tools.pdf'   index.html   Network
vishal@vishal:~/git-dvcs/git-demo-project$ 
```

Pull and Push Processes

The pull command used to fetch the repository from github to local while push is used to commit files from local repository to Github.

Push → Push changes to Web repository

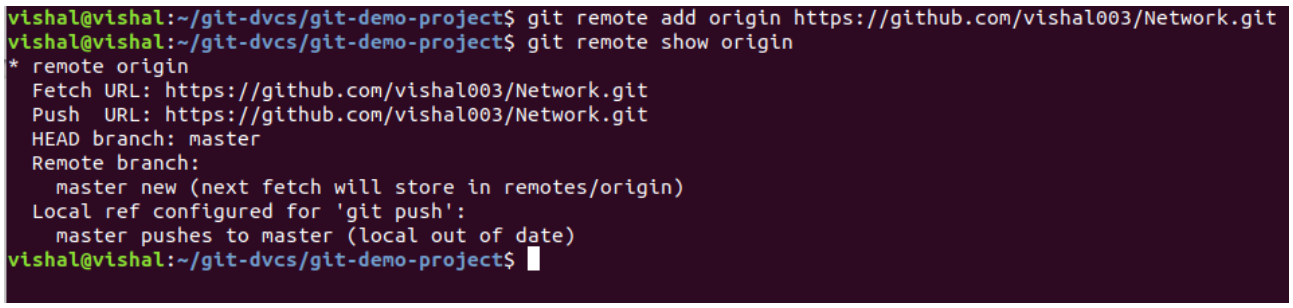
Pull → Pull changes to Local repository

The following commands are used for pull and push repositories

A) Push command

vishal@vishal:~/git-dvcs/git-demo-project$ git remote add origin https://github.com/vishal003/Network.git

vishal@vishal:~/git-dvcs/git-demo-project$ git remote show origin



```
vishal@vishal:~/git-dvcs/git-demo-project$ git remote add origin https://github.com/vishal003/Network.git
vishal@vishal:~/git-dvcs/git-demo-project$ git remote show origin
* remote origin
  Fetch URL: https://github.com/vishal003/Network.git
  Push  URL: https://github.com/vishal003/Network.git
  HEAD branch: master
  Remote branch:
    master new (next fetch will store in remotes/origin)
  Local ref configured for 'git push':
    master pushes to master (local out of date)
vishal@vishal:~/git-dvcs/git-demo-project$ 
```

If you add remote again then will show you fatal error.

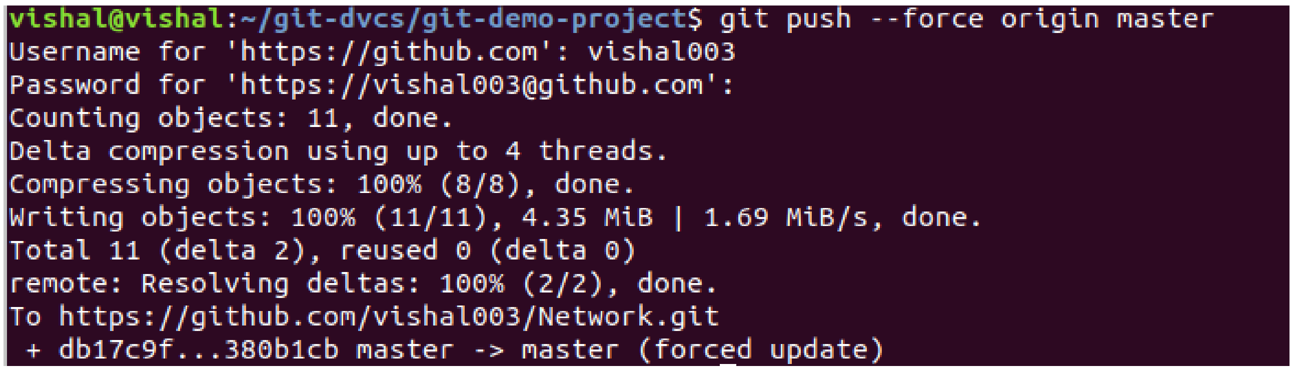
vishal@vishal:~/git-dvcs/git-demo-project$ git remote add origin https://github.com/vishal003/Myrepository.git

fatal: remote origin already exists.

So, to delete origin rm origin command is used

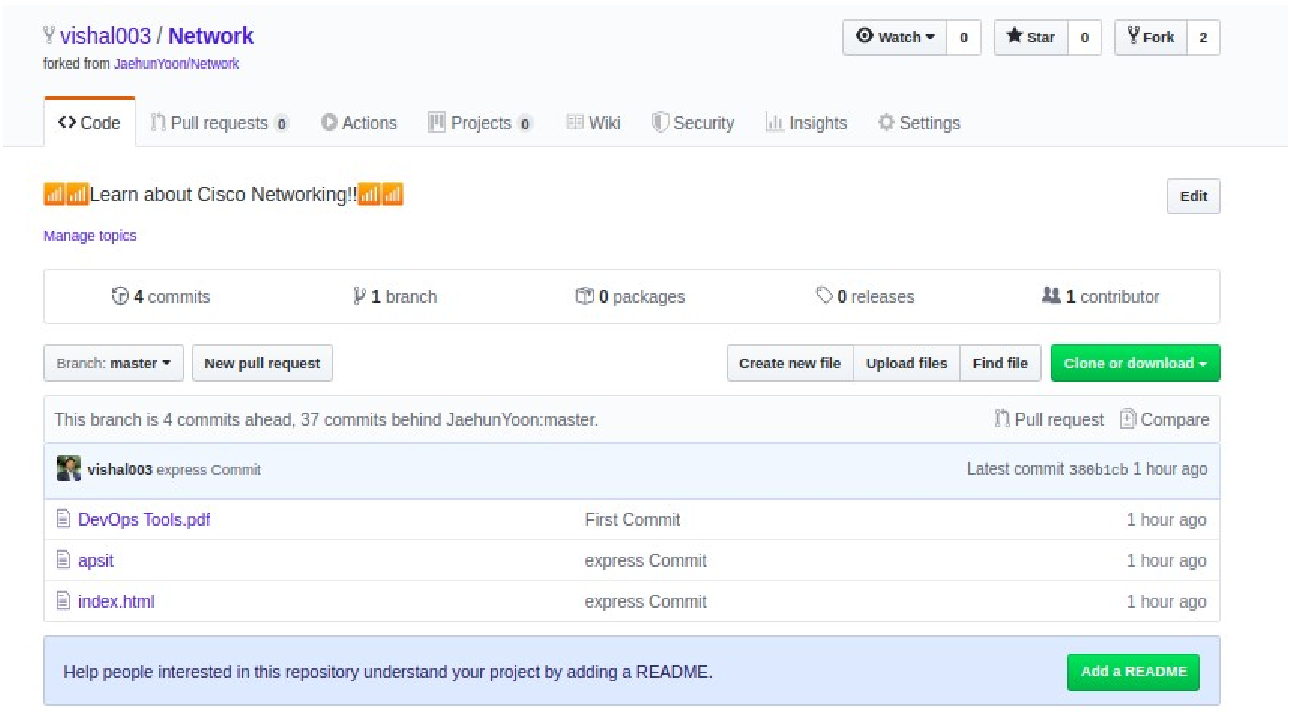
vishal@vishal:~/git-dvcs/git-demo-project$ git remote rm origin

To push the local repository to remote github following command is used



```
vishal@vishal:~/git-dvcs/git-demo-project$ git push --force origin master
Username for 'https://github.com': vishal003
Password for 'https://vishal003@github.com':
Counting objects: 11, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (11/11), 4.35 MiB | 1.69 MiB/s, done.
Total 11 (delta 2), reused 0 (delta 0)
remote: Resolving deltas: 100% (2/2), done.
To https://github.com/vishal003/Network.git
 + db17c9f...380b1cb master -> master (forced update)
```

Now you can check the github for updated contents.



vishal003 / Network
forked from JaehunYoon/Network

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4 commits | 1 branch | 0 packages | 0 releases | 1 contributor

Branch: master | New pull request | Create new file | Upload files | Find file | Clone or download

This branch is 4 commits ahead, 37 commits behind JaehunYoon:master. Pull request | Compare

vishal003 express Commit — Latest commit 380b1cb 1 hour ago

DevOps Tools.pdf	First Commit	1 hour ago
apsit	express Commit	1 hour ago
index.html	express Commit	1 hour ago

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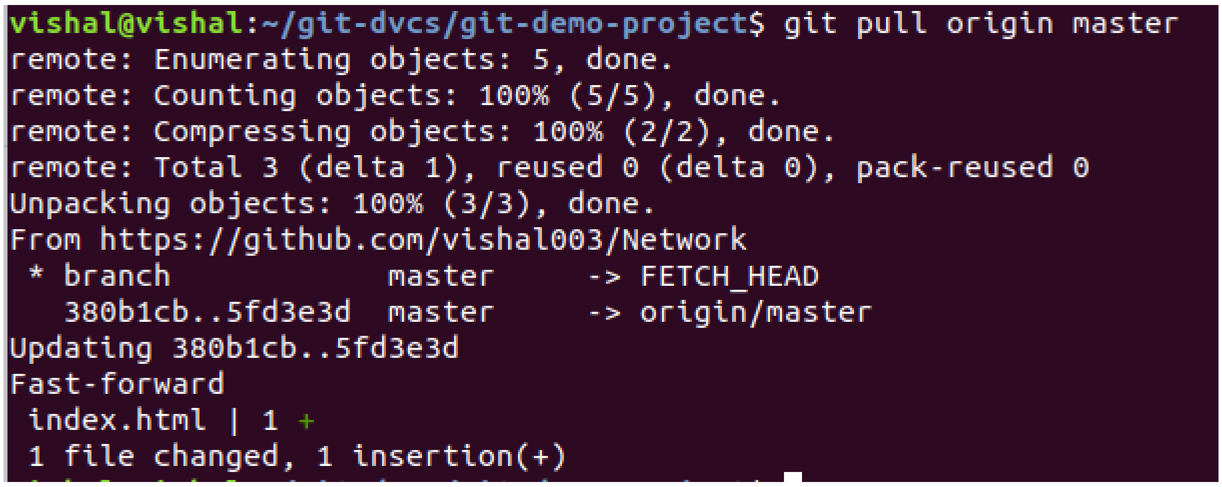
B) Pull Changes

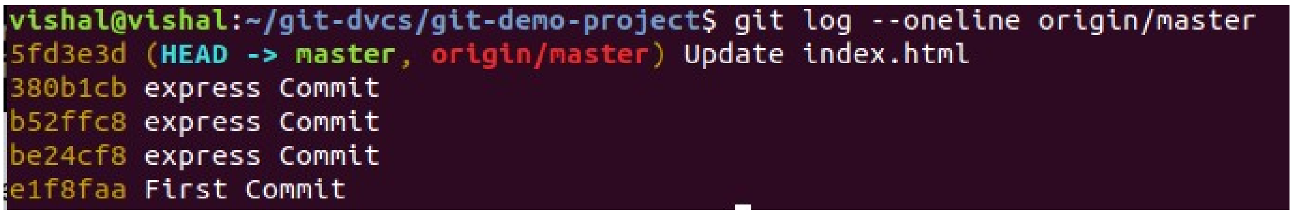
Pull command is used to download the remote updated repository into local one. The command for download is:

vishal@vishal:~/git-dvcs/git-demo-project$ git pull



```
vishal@vishal:~/git-dvcs/git-demo-project$ git pull origin master
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From https://github.com/vishal003/Network
 * branch            master     -> FETCH_HEAD
   380b1cb..5fd3e3d  master     -> origin/master
Updating 380b1cb..5fd3e3d
Fast-forward
 index.html | 1 +
 1 file changed, 1 insertion(+)
```

Now you can see the changes in local repository using git log.



```
vishal@vishal:~/git-dvcs/git-demo-project$ git log --oneline origin/master
5fd3e3d (HEAD -> master, origin/master) Update index.html
380b1cb express Commit
b52ffc8 express Commit
be24cf8 express Commit
e1f8faa First Commit
```

C) Fetch

Suppose you have a file in github and you have changes that.

Now we use fetch command to fetch the changes, which will show you both the files like

original and changed in local repository.

Here fetch will not show you like updated changes file as like push. So use merge

command to merge the changes so use following command for merge.

vishal@vishal:~/git-dvcs/git-demo-project$ git merge origin/master