Version Control using GIT

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.

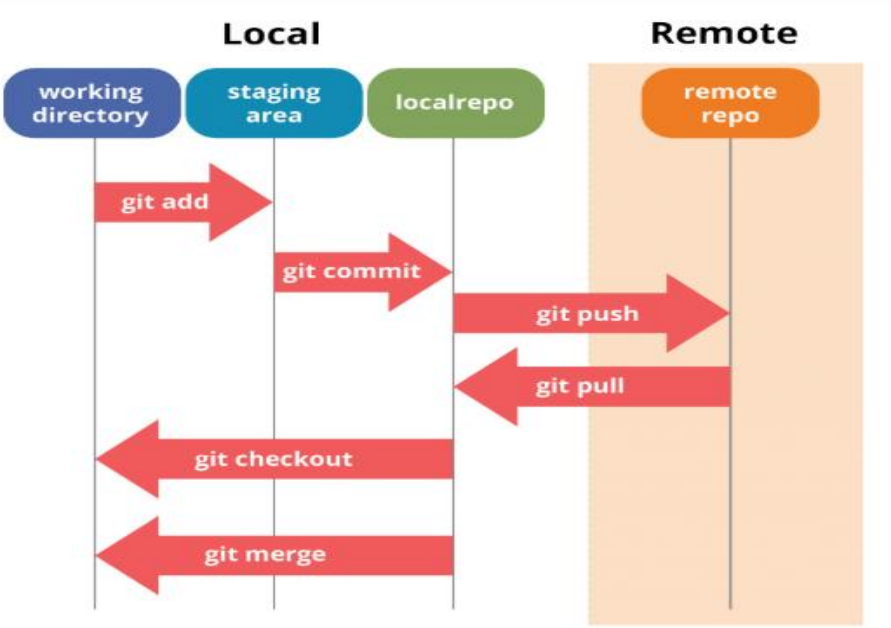
Some of the basic operations in Git are:

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

Some advanced Git operations are:

1. Branching
2. Merging
3. Rebasing

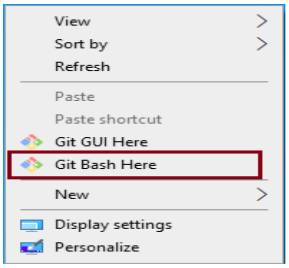
The following diagram depict the all supported operations in GIT



Installation of GIT

1) In windows, download GIT from https://git-scm.com/ and perform the straightforward installation.
2) In Ubuntu, install GIT using $sudo apt install git, Confirm the version after installation $git --version

Once installation is done, open the terminal in Ubuntu and perform the following steps or in windows Right click and select Git bash here.



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

$ mkdir git-dvcs

$ cd git-dvcs/

Now check the user information using

```
$ git config –global
As there are no users defined, let us define it using following two commands
$ git config --global user.name "bhushan"
$ git config --global user.email "bhushan,jadhav1@gmail.com"

Now, check the list of users
$ git config --global --list
user.name=bhushan
user.email=bhushan.jadhav1@gmail.com
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop
$ mkdir git-dvcs

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop
$ cd git-dvcs/

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs
$ git config --global --list
user.name=bhushan
user.email=bhushan.jadhav1@gmail.com
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs
$ cat ~/.gitconfig
[user]
        name = bhushan
        email = bhushan,jadhav1@gmail.com
```

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

```
$ mkdir git-demo-project
$ cd git-demo-project/
```

Now, initialize the repository using following command

```
$ git init
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project
$ git init
Initialized empty Git repository in C:/Users/ADMIN/Desktop/git-dvcs/git-demo-project/.git/
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ ls -a
./  ../  .git/
```

If you have existing repository, then simply delete .git file and reinitialize it.

```
$ rm -rf .git/
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project
$ ls -al
total 0
drwxr-xr-x 1 ADMIN 197121 0 Jan  1 18:19 ./
drwxr-xr-x 1 ADMIN 197121 0 Jan  1 18:17 ../
```

```
$ git init
Initialized empty Git repository in C:/Users/ADMIN/Desktop/git-dvcs/git-demo-project/.git/
```

Now, let us add some files inside our repository "git-demo-project"

To add files in index and staging area, add command is used along with dot (. Dot means current directory)

```
$ git add .
```

Index and staging area
To check the status of repository, use
$ git status

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

Now, let us commit the changes
$ git commit -m "First Commit" (#here -m for message)

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git commit -m "First Commit"
[master (root-commit) 50148fb] First Commit
 2 files changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 Gitpracts.docx
 create mode 100644 Installation and Configuration of GIT.docx
```

Add index.html in our directory

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git commit -m "First Commit"
On branch master
Untracked files:
        index.html

nothing added to commit but untracked files present
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git add .

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git commit -am "express Commit"
[master 97d0a76] express Commit
 1 file changed, 9 insertions(+)
 create mode 100644 index.html
```

$ git add .
$ git commit -am "express Commit" (#Here -a used for express commit)
$ nano index.html

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git status
On branch master
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:   index.html

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

$ touch teststatus

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git status
On branch master
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:   index.html

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

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

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git checkout -- teststatus
error: pathspec 'teststatus' did not match any file(s) known to git
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git checkout -- index.html
```

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)

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git add index.html

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   index.html

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

$ git add index.html
$ git add teststatus

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   index.html

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


ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git add teststatus

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   index.html
        new file:   teststatus
```

```
$ git commit -am "Express commit"
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git commit -am "Express commit"
[master d3a6a76] Express commit
 2 files changed, 2 insertions(+), 2 deletions(-)
 create mode 100644 teststatus
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git status
On branch master
nothing to commit, working tree clean
```

History of Commits

```
$ git log
```

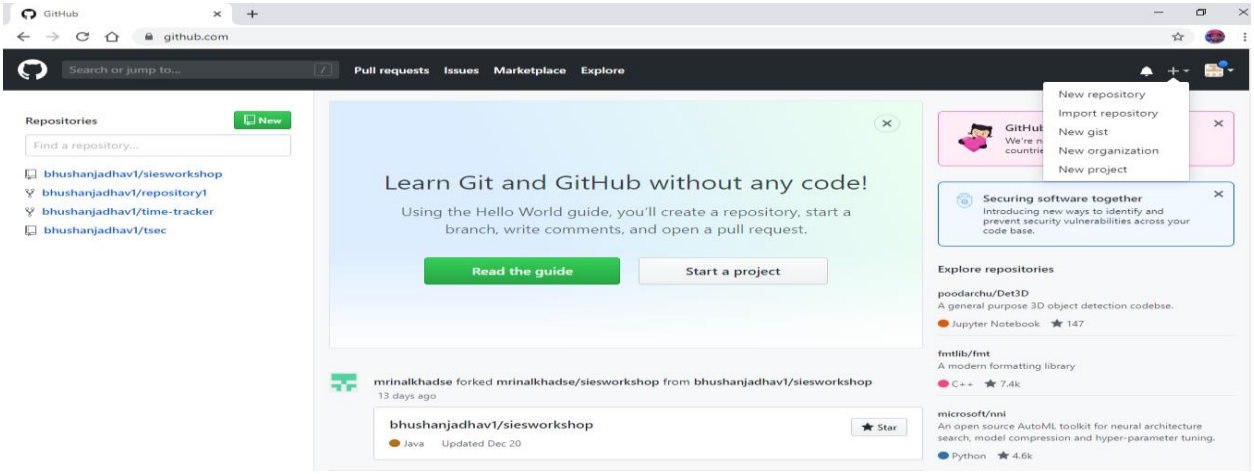
```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log
commit d3a6a763ff5a1fa33e16686d8d6c83ee8489843b (HEAD -> master)
Author: bhushan <bhushan,jadhav1@gmail.com>
Date:   Wed Jan 1 18:44:36 2020 +0530

    Express commit

commit 97d0a7681d218e1f45dd753c381254d2fa36141d
Author: bhushan <bhushan,jadhav1@gmail.com>
Date:   Wed Jan 1 18:32:44 2020 +0530

    express Commit

commit 50148fb629e12e29eaee04277be7a97afdbdd824
Author: bhushan <bhushan,jadhav1@gmail.com>
Date:   Wed Jan 1 18:26:02 2020 +0530

    First Commit
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline
d3a6a76 (HEAD -> master) Express commit
97d0a76 express Commit
50148fb First Commit
```

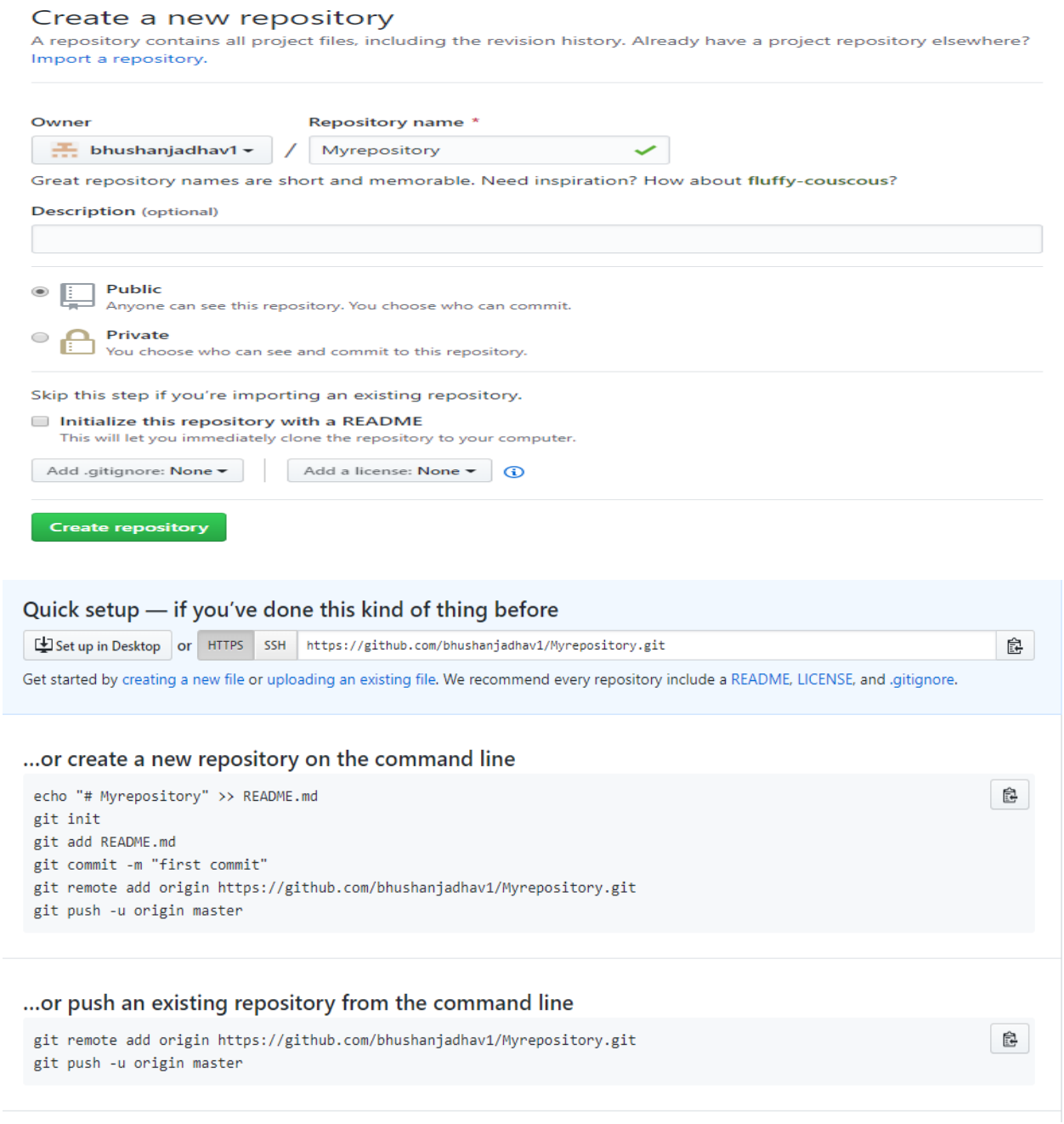
```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline teststatus
d3a6a76 (HEAD -> master) Express commit
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline
d3a6a76 (HEAD -> master) Express commit
97d0a76 express Commit
50148fb First Commit

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline 97d0a76..d3a6a76
d3a6a76 (HEAD -> master) Express commit

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline -n 2
d3a6a76 (HEAD -> master) Express commit
97d0a76 express Commit
```

Now Create a Repository on github.com. Open github.com→ create an account→After login Select New repository from the menu.



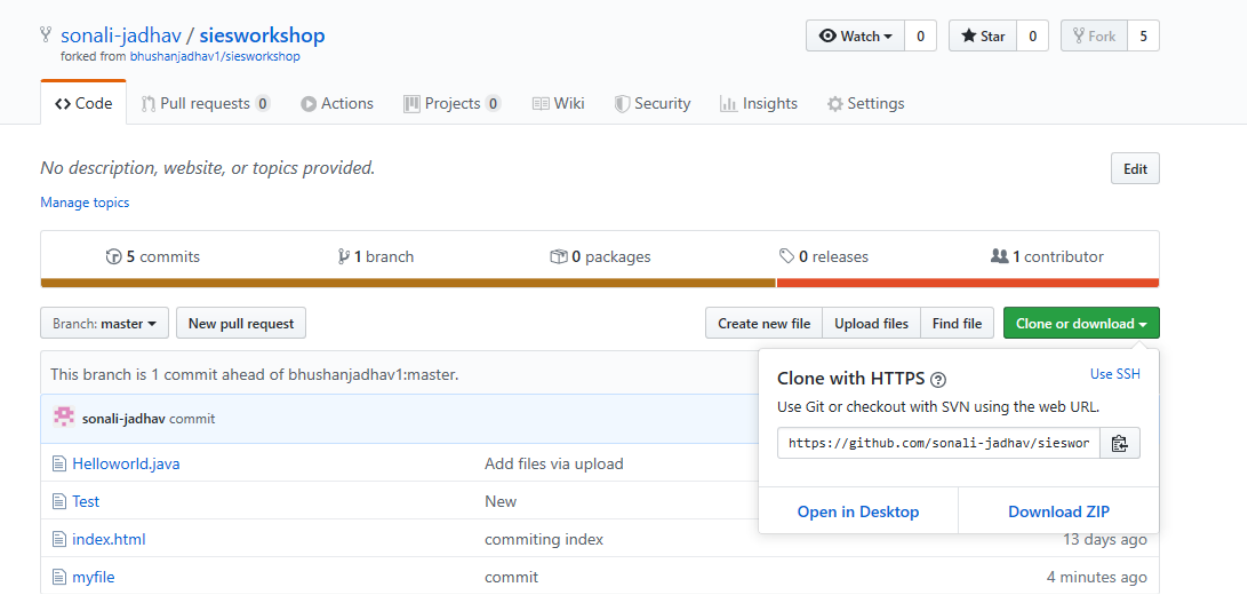
Now Specify a Name to repository and select public option followed by create repository



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.

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git clone https://github.com/bhushanjadhav1/siesworkshop
Cloning into 'siesworkshop'...
remote: Enumerating objects: 12, done.
remote: Counting objects: 100% (12/12), done.
remote: Compressing objects: 100% (9/9), done.
remote: Total 12 (delta 0), reused 9 (delta 0), pack-reused 0
Unpacking objects: 100% (12/12), done.

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ ls
 Gitpracts.docx   index.html  'Installation and Configuration of GIT.docx'   siesworkshop/   teststatus
```



Pull and Push Processes

Push → Push changes to Web repository

Pull → Pull changes to Local repository

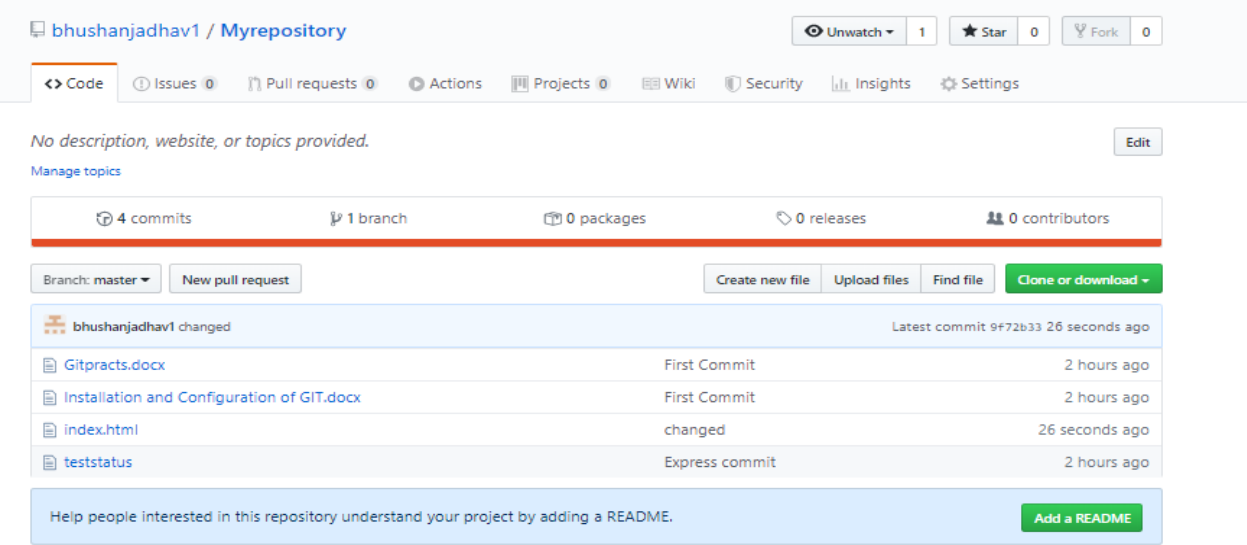
1) Push command to remote reference origin master

```
$ git remote add origin https://github.com/bhushanjadhav1/siesworkshop.git
$ git remote show origin
```

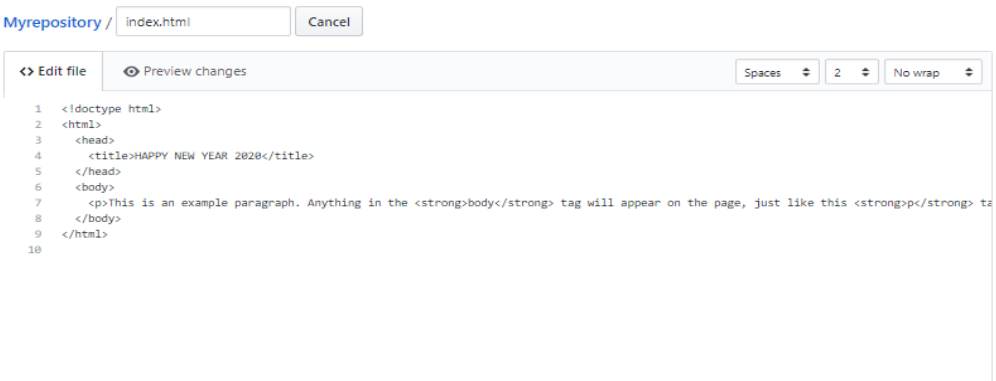
```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git remote show origin
* remote origin
  Fetch URL: https://github.com/bhushanjadhav1/siesworkshop.git
  Push  URL: https://github.com/bhushanjadhav1/siesworkshop.git
  HEAD branch: master
  Remote branch:
    master new (next fetch will store in remotes/origin)
  Local ref configured for 'git push':
    master pushes to master (local out of date)
```

```
$ git remote add origin https://github.com/bhushanjadhav1/Myrepository.git
fatal: remote origin already exists.

$ git remote rm origin

$ git push -u origin master
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git push -u origin master
Enumerating objects: 11, done.
Counting objects: 100% (11/11), done.
Delta compression using up to 4 threads
Compressing objects: 100% (10/10), done.
Writing objects: 100% (11/11), 770.93 KiB | 10.56 MiB/s, done.
Total 11 (delta 3), reused 0 (delta 0)
remote: Resolving deltas: 100% (3/3), done.
To https://github.com/bhushanjadhav1/Myrepository.git
 * [new branch]      master -> master
Branch 'master' set up to track remote branch 'master' from 'origin'.
```



Pull Changes

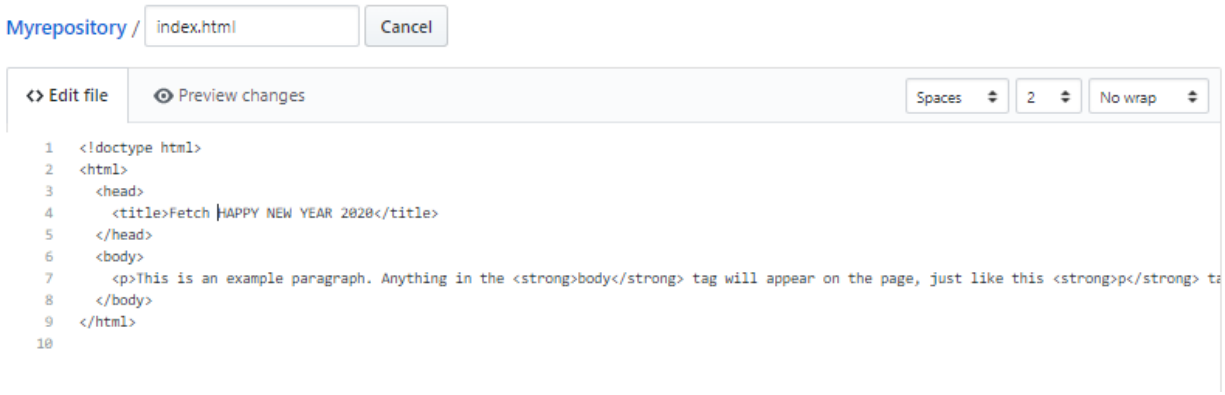


$ git pull

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git pull
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 3 (delta 2), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From https://github.com/bhushanjadhav1/Myrepository
   d3a6a76..9f72b33  master     -> origin/master
Updating d3a6a76..9f72b33
Fast-forward
 index.html | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)
```

Fetch

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline origin/master
9f72b33 (origin/master) changed
d3a6a76 Express commit
97d0a76 express Commit
50148fb First Commit
```



$ git fetch

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

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git fetch
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 3 (delta 2), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From https://github.com/bhushanjadhav1/Myrepository
   9f72b33..21e9ada  master     -> origin/master
```

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git log --oneline origin/master
21e9ada (origin/master) Fetch
9f72b33 changed
d3a6a76 Express commit
97d0a76 express Commit
50148fb First Commit
```

$ git merge origin/master

```
ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ cat index.html
<!doctype html>
<html>
  <head>
    <title>FETCH....HAPPY NEW YEAR 2020</title>
  </head>
  <body>
    <p>This is an example paragraph. Anything in the <strong>body</strong> tag will appear on the page, just like this <strong>p</strong> tag and its contents.</p>
  </body>
</html>

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ git merge
Merge made by the 'recursive' strategy.
 index.html | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

ADMIN@DESKTOP-J582V2L MINGW64 ~/Desktop/git-dvcs/git-demo-project (master)
$ cat index.html
<!doctype html>
<html>
  <head>
    <title>HAPPY NEW YEAR 2020</title>
  </head>
  <body>
    <p>This is an example paragraph. Anything in the <strong>body</strong> tag will appear on the page, just like this <strong>p</strong> tag and its contents.</p>
  </body>
</html>
```