Subject Name: **Source Code Management**

Subject Code: **CS181**

Cluster: **Beta**

Department: **DCSE**

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Submitted To:
Dr. Monit Kapoor

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INTRODUCTION

What is GIT and why is it used?

Git is a source code management technology used by DevOps. Git is a piece of software that allows you to track changes in any group of files. It is a free and open-source version control system that may be used to efficiently manage small to big projects. Git is a version control system that allows numerous developers to collaborate on non-linear development projects.
Git is an example of a distributed version control system (DVCS) (hence Distributed Version Control System).

What is GITHUB?

GitHub is a version management and collaboration tool for programming. It allows you and others to collaborate on projects from any location.

What is the difference between GIT and GITHUB?

Git	GitHub
1. It is a software	1. It is a service
2. It is installed locally on the system	2. It is hosted on Web
3. It is a command line tool	3. It provides a graphical interface
4. It is a tool to manage different versions of edits, made to files in a git repository	4. It is a space to upload a copy of the Git repository
5. It provides functionalities like Version Control System Source Code Management	5. It provides functionalities of Git like VCS, Source Code Management as well as adding few of its own features

What is Repository?

A repository stores all of your project's files, as well as the revision history for each one. Within the repository, you may discuss and monitor your project's progress. The.git/ subdirectory within a project is a Git repository. This repository keeps track of any changes made to files in your project over time, creating a history. That is, if you delete the.git/ subdirectory, you are also deleting the history of your project.

What is Version Control System (VCS)?

Version Control Systems are the software tools for tracking/managing all the changes made to the source code during the project development. It keeps a record of every single change made to the code. It also allows us to turn back to the previous version of the code if any mistake is made in the current version. Without a VCS in place, it would not be possible to monitor the development of the project.

Types of VCS

- Local Version Control System
- Centralized Version Control System
- Distributed Version Control System

I. **Local Version Control System:** Local Version Control System is located in your local machine. If the local machine crashes, it would not be possible to retrieve the files, and all the information will be lost. If anything happens to a single version, all the versions made after that will be lost.

II. **Centralized Version Control System:** In the Centralized Version Control Systems, there will be a single central server that contains all the files related to the project, and many collaborators checkout files from this single server (you will only have a working copy). The problem with the Centralized Version Control Systems is if the central server crashes, almost everything related to the project will be lost.

III. **Distributed Version Control System:** In a distributed version control system, there will be one or more servers and many collaborators similar to the centralized system. But the difference is, not only do they check out the latest version, but each collaborator will have an exact copy of the main repository on their local machines. Each user has their own repository and a working copy. This is very useful because even if the server crashes we would not lose everything as several copies are residing in several other computers.

Experiment No. 01

Aim: Setting up of Git Client

Theory:
GIT –> It is basically used for pushing and pulling of code. We can use git and git-hub parallelly to work with multiple members or individually. We can make , edit , recreate ,copy or download any code on git hub using git.

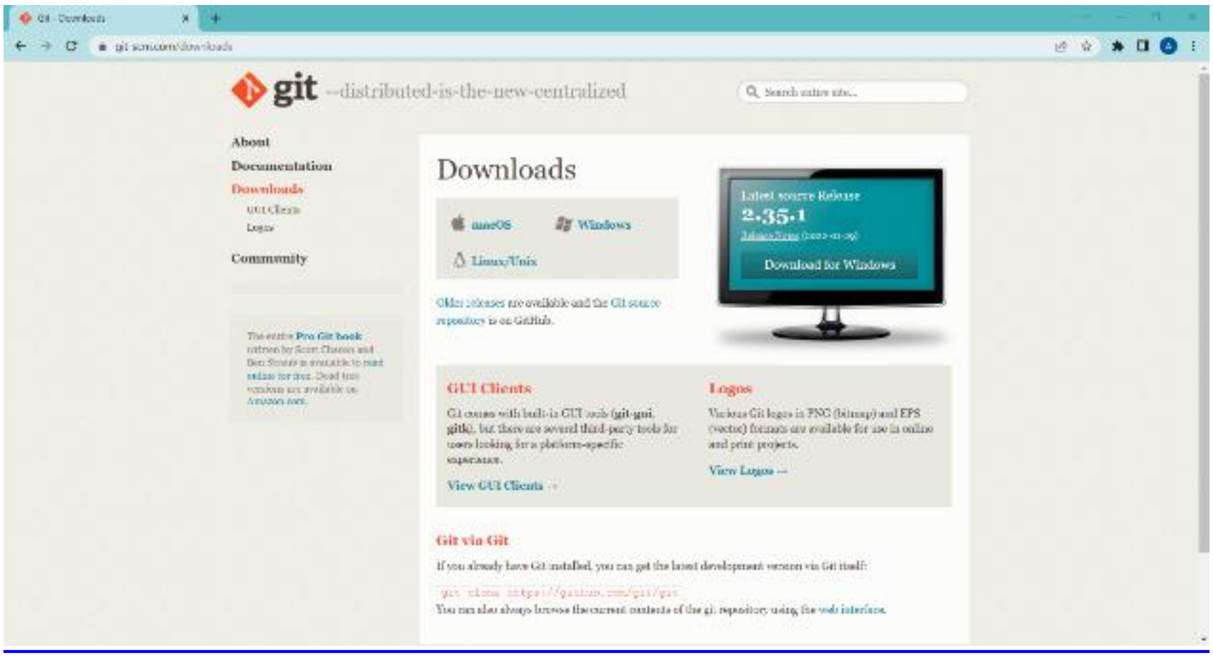
What is GIT ? –> It's a Version Control System(VCS) -> It is a software or we can say a server by which we are able to track all the previous changes in the code.

Advantages of GIT –>

Procedure: We can install Git on Windows, using the most official build which is available for download on the GIT's official website or by just typing (s c m git) on any search engine . We can go on https://git-scm.com/download/win and can select the platform and bit-version to download. And after clicking on your desired bit-version or ios it will start downloading automatically.

Snapshots of download:

✧ You must first access this webpage and then choose your operating system by clicking on it. I'll walk you through the processes for the Windows operating system in this article.


git-scm.com/downloads

git --distributed-is-the-new-centralized

Search entire site...

About
Documentation
Downloads
GUI Clients
Logos
Community

The entire Pro Git book written by Scott Chacon and Ben Straub is available to read online for free. Dead tree versions are available on Amazon.com.

Downloads

macOS Windows
Linux/Unix

Older releases are available and the Git source repository is on GitHub.

Latest source Release
2.35.1
Release Notes (2022-01-29)
Download for Windows

GUI Clients

Git comes with built-in GUI tools (git-gui, gitk), but there are several third-party tools for users looking for a platform-specific experience.

View GUI Clients →

Logos

Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in online and print projects.

View Logos →

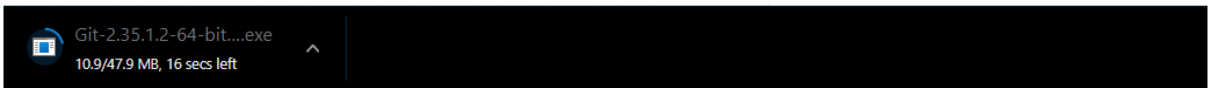
Git via Git

If you already have Git installed, you can get the latest development version via Git itself:

```
git clone https://github.com/git/git
```

You can also always browse the current contents of the git repository using the web interface.

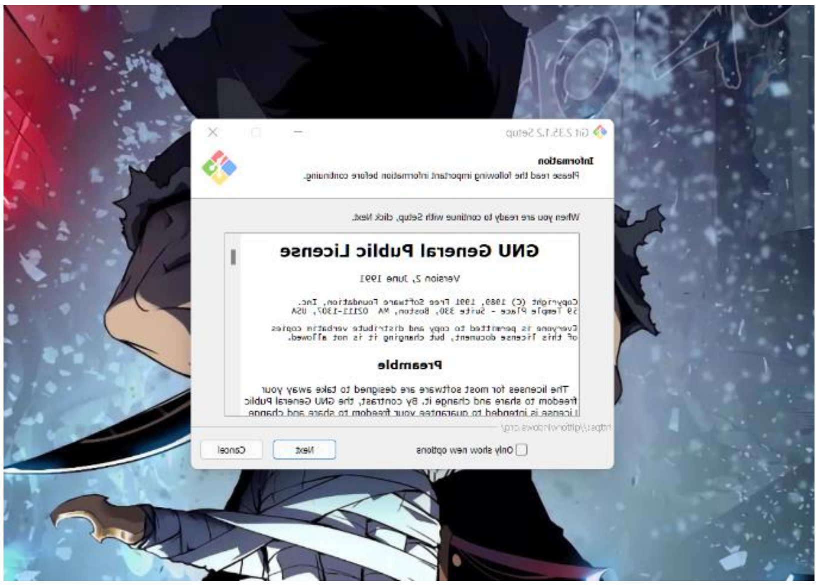
Select the CPU for your system now. (Most of the system now runs on 64-bit processors.) Your download will begin when you pick a processor.


Git-2.35.1.2-64-bit....exe
10.9/47.9 MB, 16 secs left

You must now open the Git folder.

✧ You will be asked if you want to enable this programe to make modifications to your PC once you launch it.

✧ YES should be selected.



Git 2.35.1.2 Setup

Information

Please read the following important information before continuing.

When you are ready to continue with Setup, click Next.

GNU General Public License

Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.
59 Temple Place - Suite 330, Boston, MA 02111-1307, USA

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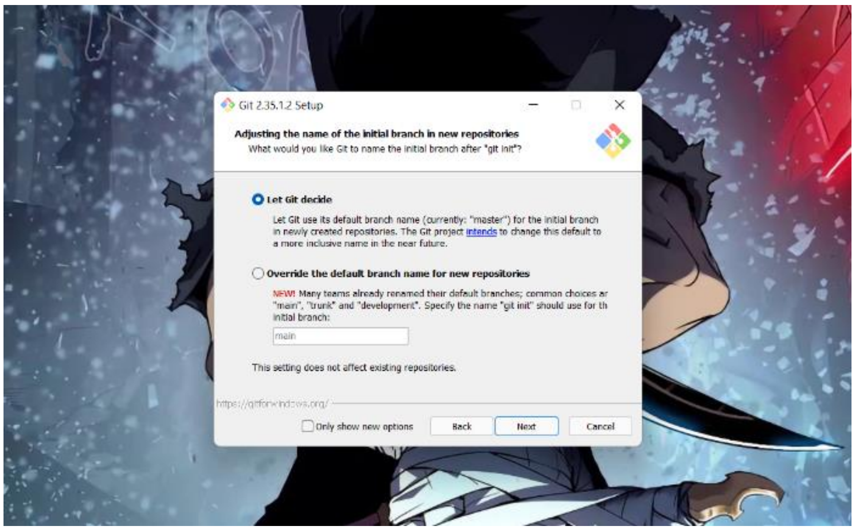
of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
License is intended to guarantee your freedom to share and change

https://gitforwindows.org/

✧ Click on Next



Git 2.35.1.2 Setup

Adjusting the name of the initial branch in new repositories

What would you like Git to name the initial branch after "git init"?

● **Let Git decide**

Let Git use its default branch name (currently: "master") for the initial branch in newly created repositories. The Git project intends to change this default to a more inclusive name in the near future.

○ **Override the default branch name for new repositories**

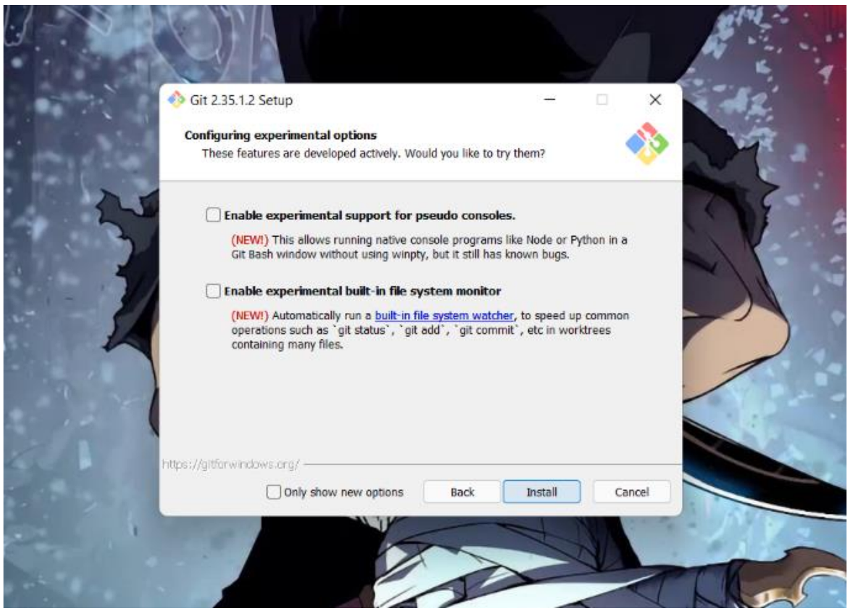
NEW! Many teams already renamed their default branches; common choices ar "main", "trunk" and "development". Specify the name "git init" should use for th initial branch:

main

This setting does not affect existing repositories.

https://gitforwindows.org/

✧ Continue clicking on next few times more



Git 2.35.1.2 Setup

Configuring experimental options

These features are developed actively. Would you like to try them?

☐ **Enable experimental support for pseudo consoles.**

(NEW!) This allows running native console programs like Node or Python in a Git Bash window without using winpty, but it still has known bugs.

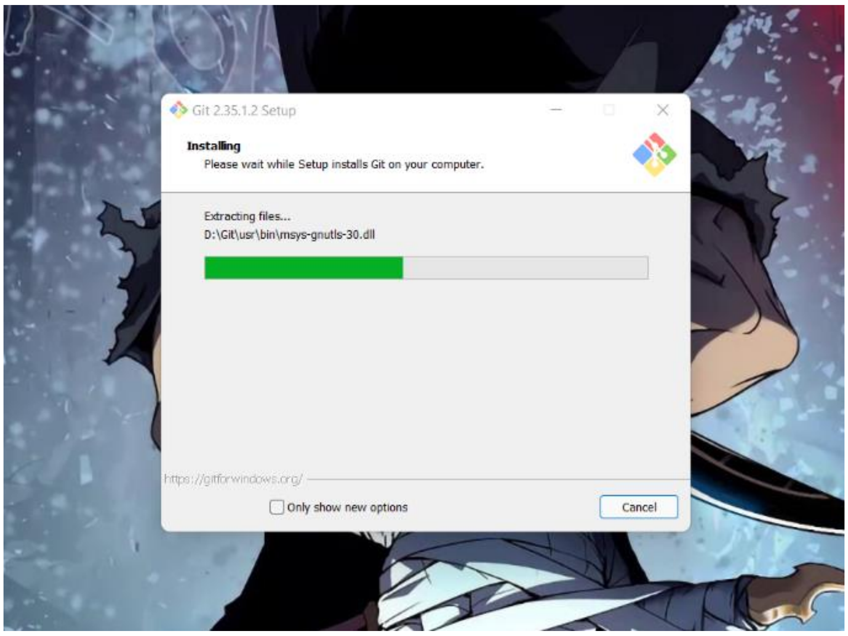
☐ **Enable experimental built-in file system monitor**

(NEW!) Automatically run a built-in file system watcher, to speed up common operations such as `git status`, `git add`, `git commit`, etc in worktrees containing many files.

https://gitforwindows.org/

☐ Only show new options

✧ Now select the Install option.



Git 2.35.1.2 Setup

Installing

Please wait while Setup installs Git on your computer.

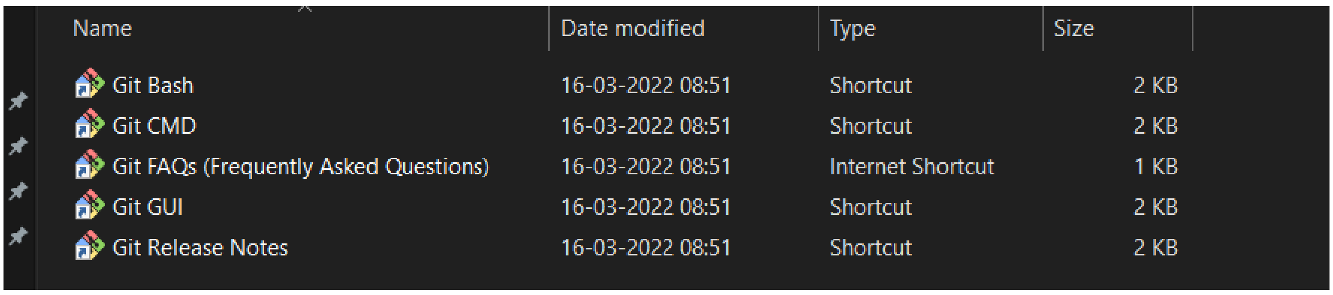
Extracting files...
D:\Git\usr\bin\msys-gnutls-30.dll

https://gitforwindows.org/

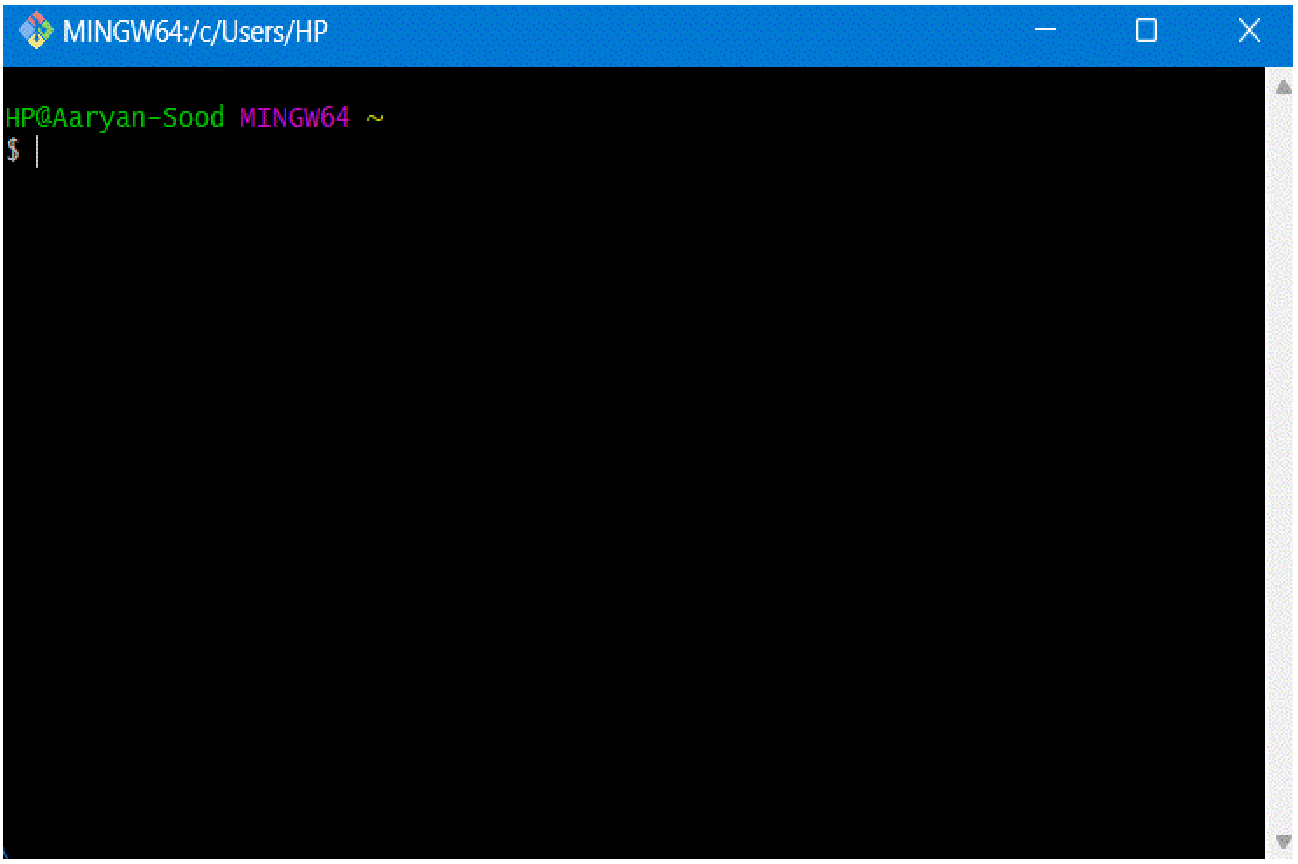
☐ Only show new options

✧ Click on Finish after the installation is finished.

The installation of the git is finished and now we have to setup git client and GitHub account



Name	Date modified	Type	Size
Git Bash	16-03-2022 08:51	Shortcut	2 KB
Git CMD	16-03-2022 08:51	Shortcut	2 KB
Git FAQs (Frequently Asked Questions)	16-03-2022 08:51	Internet Shortcut	1 KB
Git GUI	16-03-2022 08:51	Shortcut	2 KB
Git Release Notes	16-03-2022 08:51	Shortcut	2 KB



```
HP@Aaryan-Sood MINGW64 ~
$ |
```

Experiment No. 02

Aim: Setting up GitHub Account

Theory:

What is GitHub -> GitHub is a website and cloud-based service (client) that helps an individual or a developers to store and manage their code. We can also track as well as control changes to our or public code.

Advantages of GitHub -> GitHub's has a user-friendly interface and is easy to use .We can connect the git-hub and git but using some commands shown below in figure 001. Without GitHub we cannot use Git because it generally requires a host and if we are working for a project we need to share it will our team members, which can only be done by making a repository . Additionally , anyone can sign up and host a public code repository for free, which makes GitHub especially popular with open-source projects.

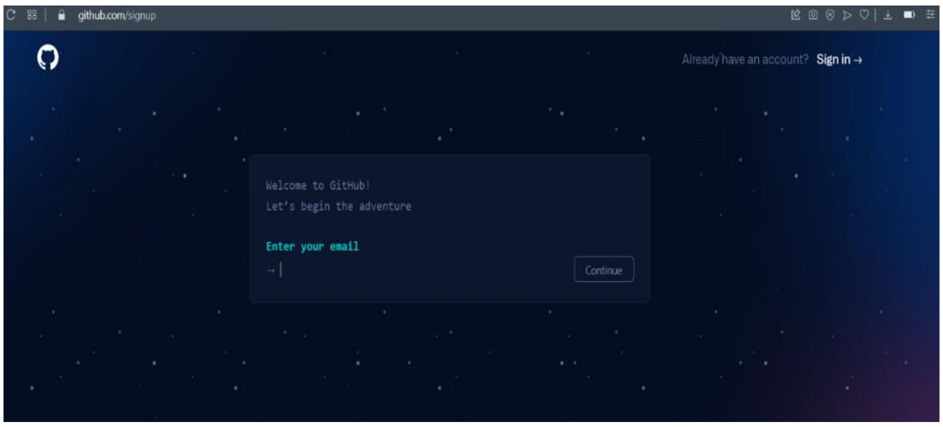
Procedure:-

Step1 :-

Google (any search engine)
Search for git-hub or (https://github.com/signup).

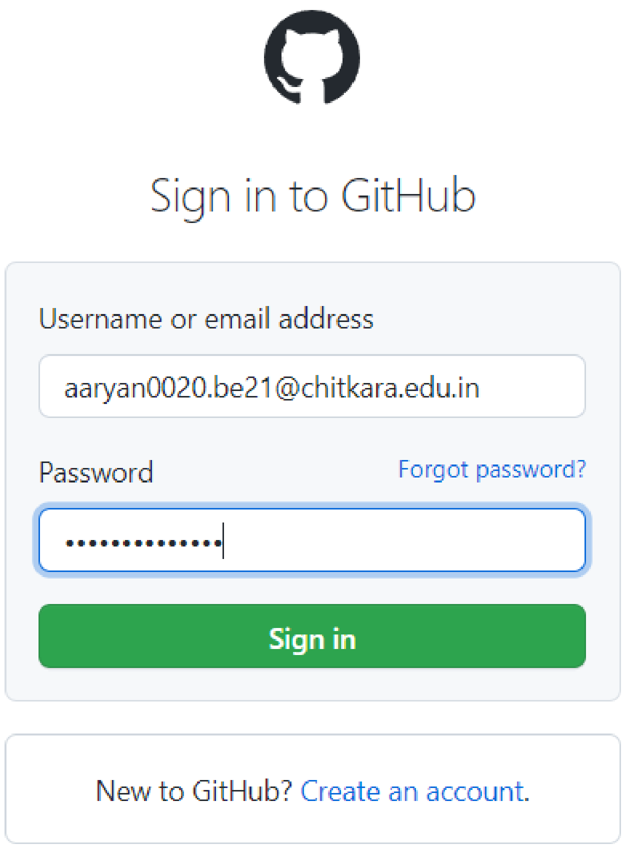
Step2 :-

Snapshots –



After visiting the link this type of interface will appear, if you already have account you can sign in and if not you can create.

Sign in into GIT-HUB :-



Sign in to GitHub

Username or email address

aaryan0020.be21@chitkara.edu.in

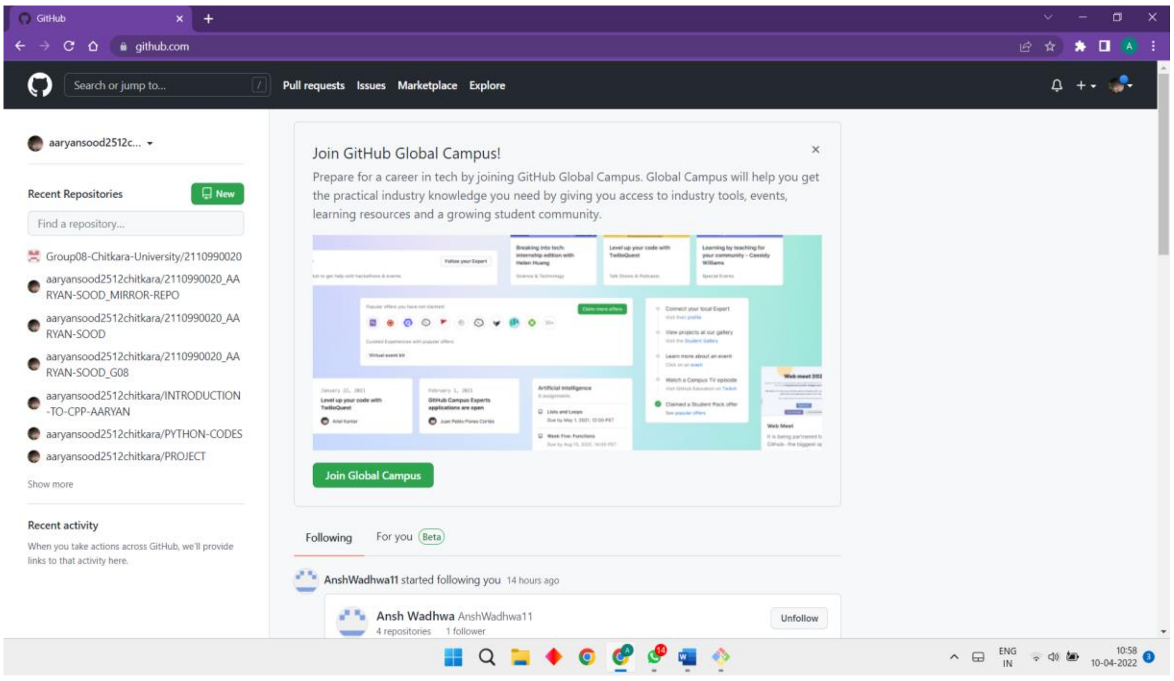
Password Forgot password?

••••••••••••••

Sign in

New to GitHub? Create an account.

Interface of GitHub :-



aaryansood2512c...

Recent Repositories New

Find a repository...

Group08-Chitkara-University/2110990020
aaryansood2512chitkara/2110990020_AARYAN-SOOD_MIRROR-REPO
aaryansood2512chitkara/2110990020_AARYAN-SOOD
aaryansood2512chitkara/2110990020_AARYAN-SOOD_G08
aaryansood2512chitkara/INTRODUCTION-TO-CPP-AARYAN
aaryansood2512chitkara/PYTHON-CODES
aaryansood2512chitkara/PROJECT

Show more

Recent activity

When you take actions across GitHub, we'll provide links to that activity here.

Join GitHub Global Campus!

Prepare for a career in tech by joining GitHub Global Campus. Global Campus will help you get the practical industry knowledge you need by giving you access to industry tools, events, learning resources and a growing student community.

AnshWadhwa11 started following you 14 hours ago

Ansh Wadhwa AnshWadhwa11
4 repositories 1 follower

ENG IN 10:58 10-04-2022

To link GitHub account with Git bash –

<u>For username</u>:-

git config --global user.name “username in git-hub”

<u>For user email</u>:-

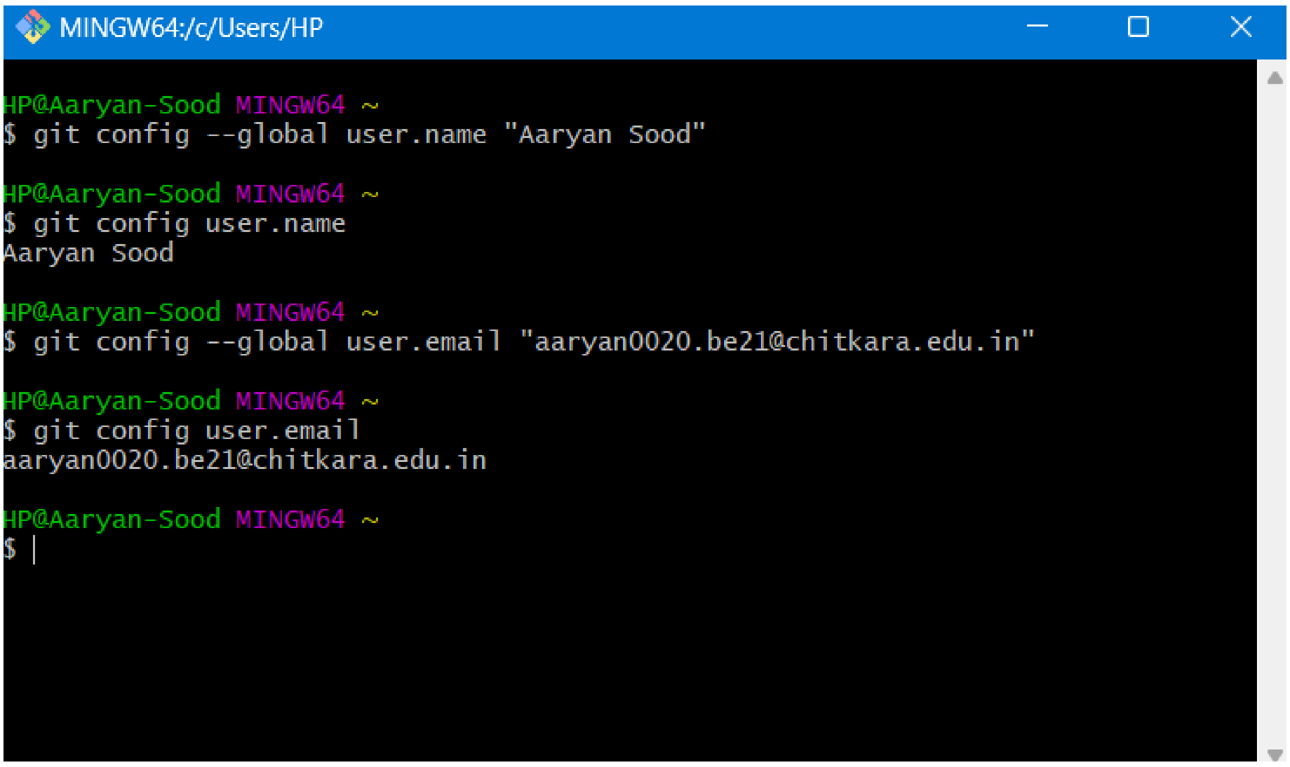
git config --global user.email “your email in git-hub”

<u>To verify</u>:-

git config user.name

git config user.email

Snapshot :-



```
MINGW64:/c/Users/HP

HP@Aaryan-Sood MINGW64 ~
$ git config --global user.name "Aaryan Sood"

HP@Aaryan-Sood MINGW64 ~
$ git config user.name
Aaryan Sood

HP@Aaryan-Sood MINGW64 ~
$ git config --global user.email "aaryan0020.be21@chitkara.edu.in"

HP@Aaryan-Sood MINGW64 ~
$ git config user.email
aaryan0020.be21@chitkara.edu.in

HP@Aaryan-Sood MINGW64 ~
$ |
```

Aim: Program to Generate log

Theory:-

Logs -> Logs are nothing but the history which we can see in git by using the code git log. It contains all the past commits, insertions and deletions in it which we can see any time.

- ✧ **Why logs -> Logs helps to check that what were the changes in the code or any other file and by whom. It also contains the number of insertions and deletions including at which time it was changed.**

  First of all create a local repository using Git. For this, you have to make a folder in your device, right click and select "**Git Bash Here**". This opens the Git terminal. To create a new local repository, use the command "**git init**" and it creates a folder **.git**

- ✧ When we use GIT for the first time, we have to give the user name and email so that if I am going to change in project, it will be visible to all.

  For this, we use command →
  "git config --global user.name *Name*"
  "git config --global user.email *email*"

  For verifying the user's name and email, we use →
  "git config --global user.name"
  "git config --global user.email"

Some Important Commands:

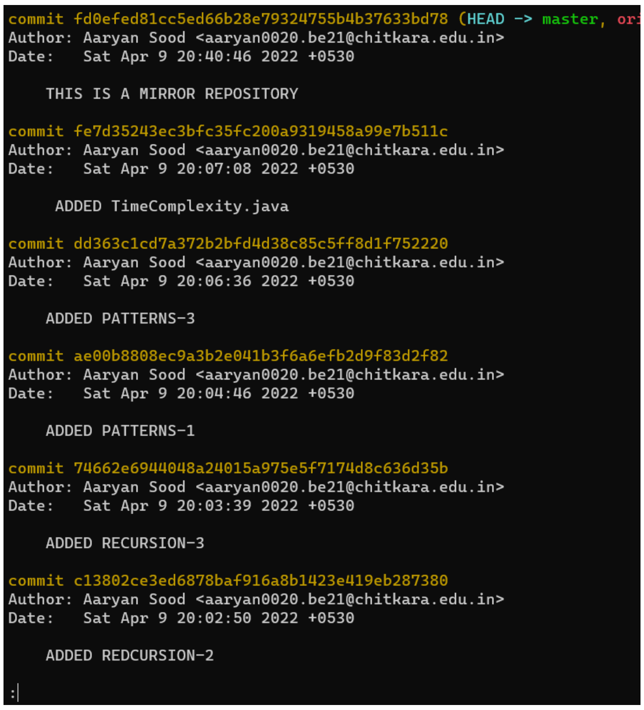
- **ls →** It gives the file names in the folder.

- **ls -lart →** Gives the hidden files also.
- **git status →** Displays the state of the working directory and the staged snapshot.
- **touch filename →** This command creates a new file in the repository.
- **Clear →** It clears the terminal.
- **rm -rf .git →** It removes the repository.
- **git log →** displays all of the commits in a repository's history
- **git diff →** It compares my working tree to staging area.

✧ Now, we have to create some files in the repository. Suppose we created index.html Now type git status:

git log: *The git log command displays a record of the commits in a Git repository. By default, the git log command displays a commit hash, the commit message, and other commit metadata.*

Snapshots –



```
commit fd0efed81cc5ed66b28e79324755b4b37633bd78 (HEAD -> master, ori
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:40:46 2022 +0530

    THIS IS A MIRROR REPOSITORY

commit fe7d35243ec3bfc35fc200a9319458a99e7b511c
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:07:08 2022 +0530

     ADDED TimeComplexity.java

commit dd363c1cd7a372b2bfd4d38c85c5ff8d1f752220
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:06:36 2022 +0530

    ADDED PATTERNS-3

commit ae00b8808ec9a3b2e041b3f6a6efb2d9f83d2f82
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:04:46 2022 +0530

    ADDED PATTERNS-1

commit 74662e6944048a24015a975e5f7174d8c636d35b
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:03:39 2022 +0530

    ADDED RECURSION-3

commit c13802ce3ed6878baf916a8b1423e419eb287380
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:02:50 2022 +0530

    ADDED REDCURSION-2

:
```

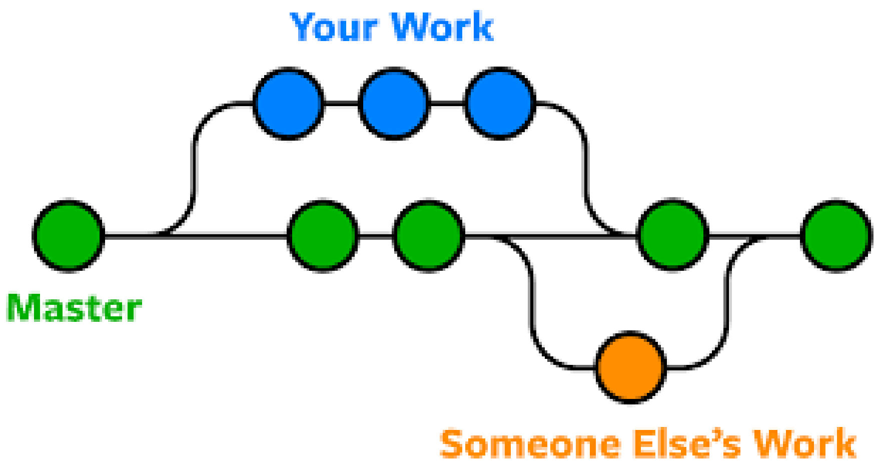
Experiment No. 04

Aim: Create and visualize branches

Create branches :-

✧ The main branch in git is called as master branch. But we can make branches out of this main master branch. All the files present in master can be shown in branch but the file which are created in branch are not shown in master branch. We can also merge both the parent (master) and child (other branches).

Branching: A branch in Git is an independent line of work(a pointer to a specific commit). It allows users to create a branch from the original code (master branch) and isolate their work. Branches allow you to work on different parts of a project without impacting the main branch.



Let us see the command of it:
Firstly, add a new branch, let us suppose the branch name is activity1.
For this use command →

- **git branch name** [adding new branch]
- **git branch** [use to see the branch's names]
- **git checkout *branch name*** [use to switch to the given branch]
- In this you can see that firstly 'git branch' shows only one branch in green colour but when we add a new branch using 'git branch act1', it shows 2 branches but the green colour and star is on master. So, we have to switch to act1 by using 'git checkout act1'. If we use 'git branch', now you can see that the green colour and star is on act1. It means you are in

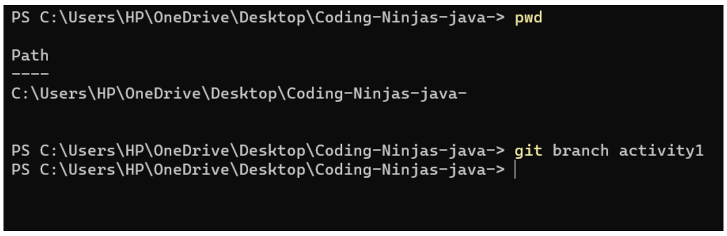
activity1 branch and all the data of master branch is also on act1 branch. Use “ls” to see the files.

-
- Now add a new file in activity1 branch, do some changes in file and commit the file.

<u>Syntax:-</u>

1. For creating a new branch.
   git branch name of branch

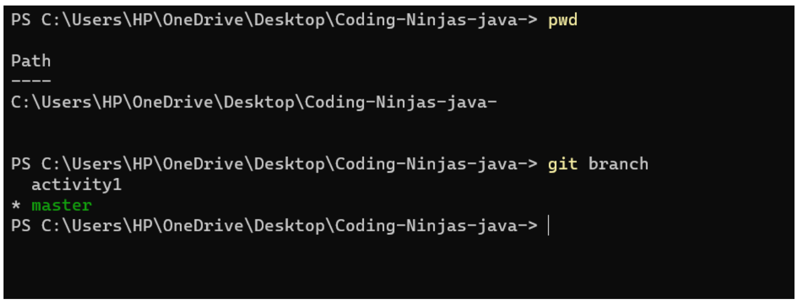
Snapshots –



```
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> pwd

Path
----
C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-


PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git branch activity1
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java->
```

2. We can also check how many branches we have.
   git branch

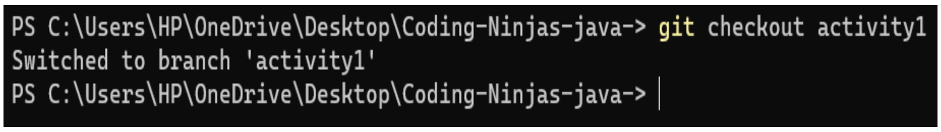
Snapshots :-



```
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> pwd

Path
----
C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-


PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git branch
  activity1
* master
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java->
```

3. To change the present working branch.
   git checkout name of branch.

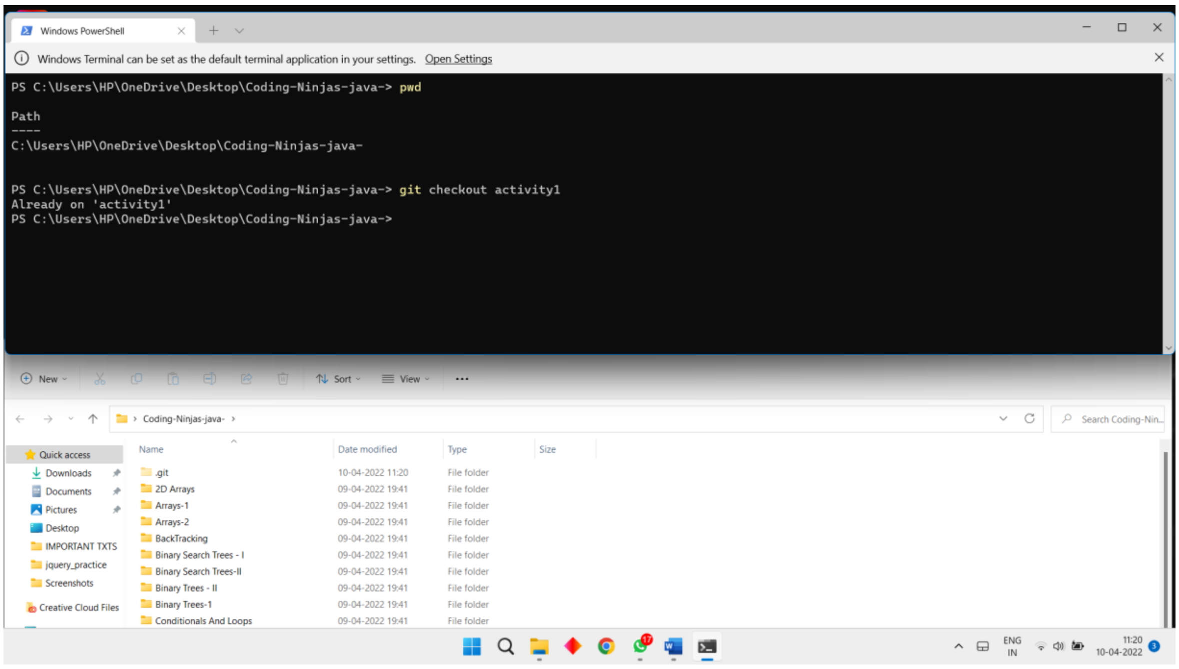
Snapshots –



```
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git checkout activity1
Switched to branch 'activity1'
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java->
```

Visualizing branches :-

To visualize I have created a new file in a new branch activity 1 instead of master branch.

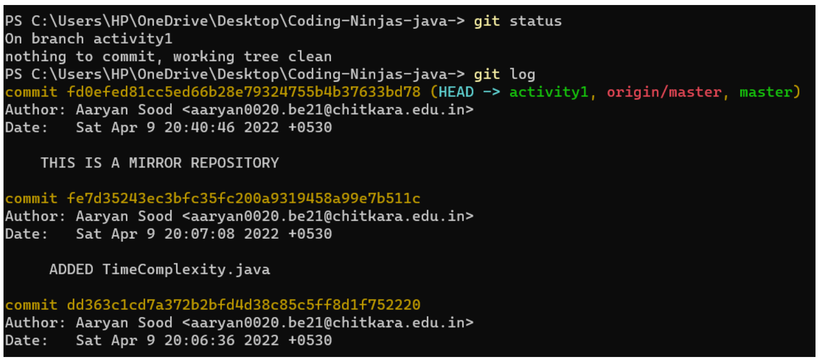


```
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> pwd

Path
----
C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-

PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git checkout activity1
Already on 'activity1'
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java->
```

Name	Date modified	Type	Size
.git	10-04-2022 11:20	File folder	
2D Arrays	09-04-2022 19:41	File folder	
Arrays-1	09-04-2022 19:41	File folder	
Arrays-2	09-04-2022 19:41	File folder	
BackTracking	09-04-2022 19:41	File folder	
Binary Search Trees - I	09-04-2022 19:41	File folder	
Binary Search Trees-II	09-04-2022 19:41	File folder	
Binary Trees - II	09-04-2022 19:41	File folder	
Binary Trees-1	09-04-2022 19:41	File folder	
Conditionals And Loops	09-04-2022 19:41	File folder	

After this I have done the 3 step architecture which is tracking the file , send it to stagging

area and finally we can role back to any previously saved version of this file.



```
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git status
On branch activity1
nothing to commit, working tree clean
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git log
commit fd0efed81cc5ed66b28e79324755b4b37633bd78 (HEAD -> activity1, origin/master, master)
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:40:46 2022 +0530

    THIS IS A MIRROR REPOSITORY

commit fe7d35243ec3bfc35fc200a9319458a99e7b511c
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:07:08 2022 +0530

     ADDED TimeComplexity.java

commit dd363c1cd7a372b2bfd4d38c85c5ff8d1f752220
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sat Apr 9 20:06:36 2022 +0530
```

After this we will change the branch from activity1 to master, but when I will switch to the

master branch there will not be the same file in the master , it will not show the new file in

the master branch.In this way we can create and change different branches . We can also merge the branches by using   git merge command.

Aim: Git lifecycle description

Theory:

Stages in GIT Life Cycle -> Files in a Git project have various stages like Creation, Modification, Refactoring, and Deletion and so on. Irrespective of whether this project is tracked by Git or not, these phases are still prevalent. However, when a project is under Git version control system, they are present in three major Git states in addition to these basic ones. Here are the three Git states:

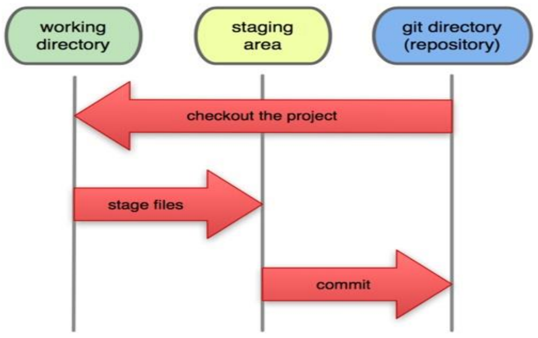
- Working directory
- Staging area
- Git directory

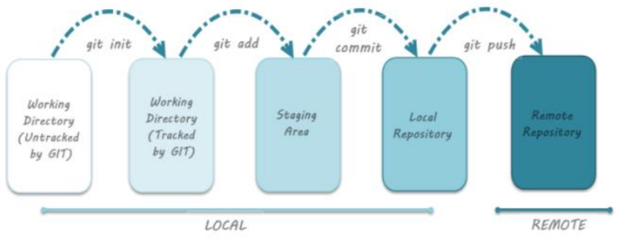
Working Directory ->
Consider a project residing in your local system. This project may or may not be tracked by Git. In either case, this project directory is called your Working directory.

Staging Area ->
Staging area is the playground where you group, add and organize the files to be committed to Git for tracking their versions

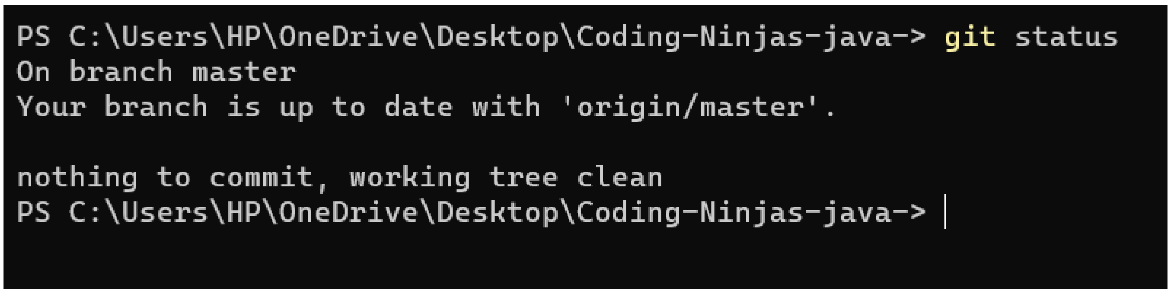
Git Directory ->
Now that the files to be committed are grouped and ready in the staging area, we can commit these files. So, we commit this group of files along with a commit message explaining what is the commit about. Apart from commit message, this step also records the author and time of the commit. Now, a snapshot of the files in the commit is recorded by Git. The information related to this commit is stored in the Git directory.

Remote Repository-> means mirror or clone of the local Git repository in GitHub. And pushing means uploading the commits from local Git repository to remote repository hosted in GitHub.

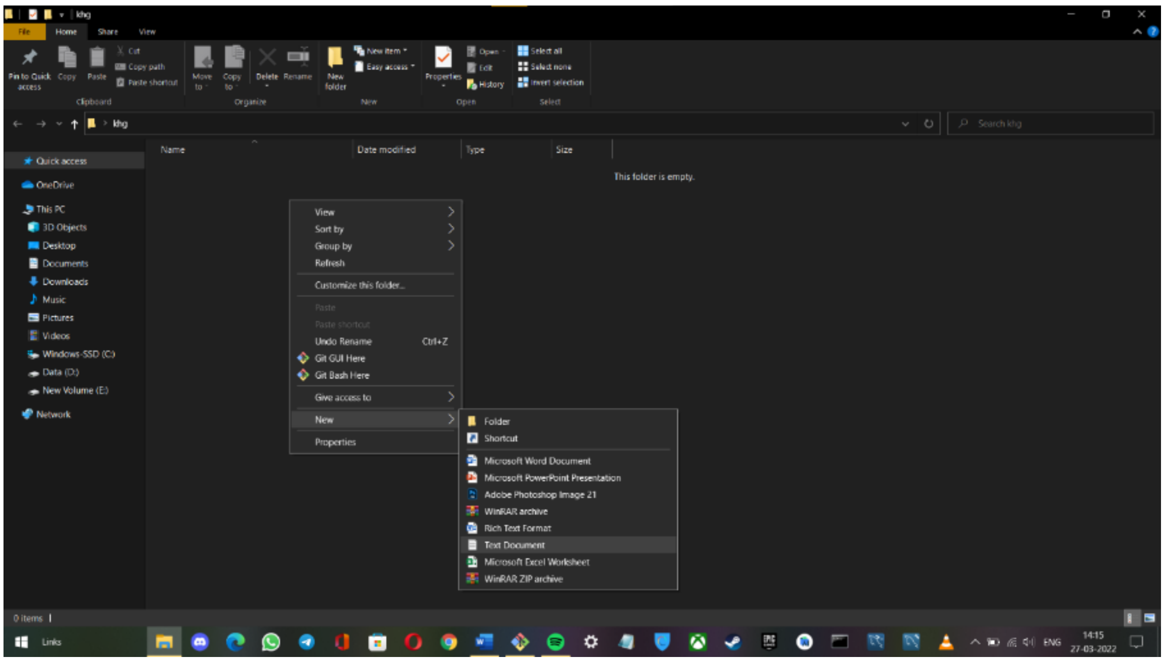


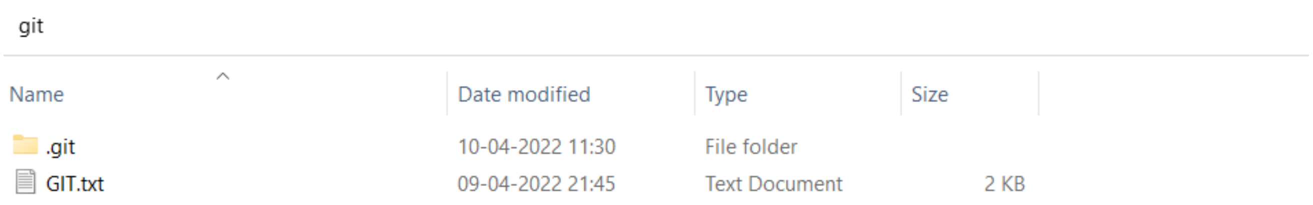


Snapshots –

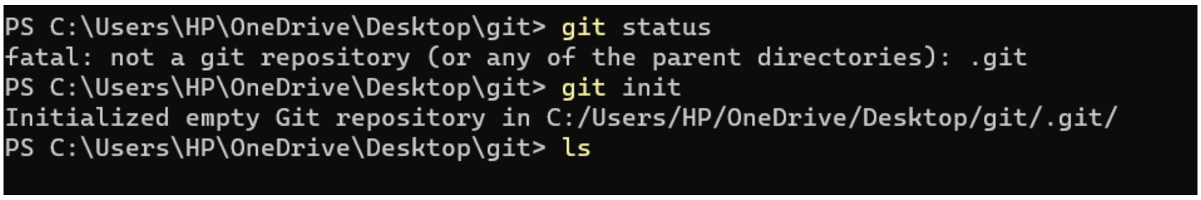


```
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java-> git status
On branch master
Your branch is up to date with 'origin/master'.

nothing to commit, working tree clean
PS C:\Users\HP\OneDrive\Desktop\Coding-Ninjas-java->
```

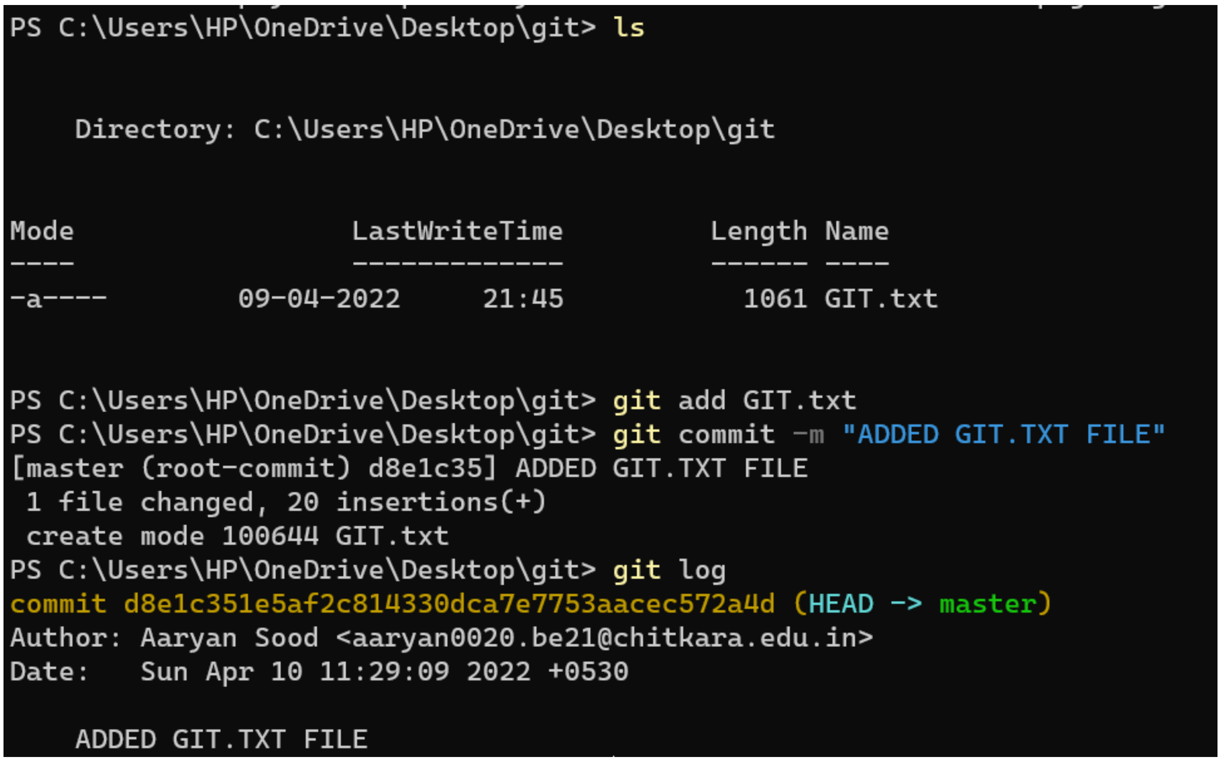




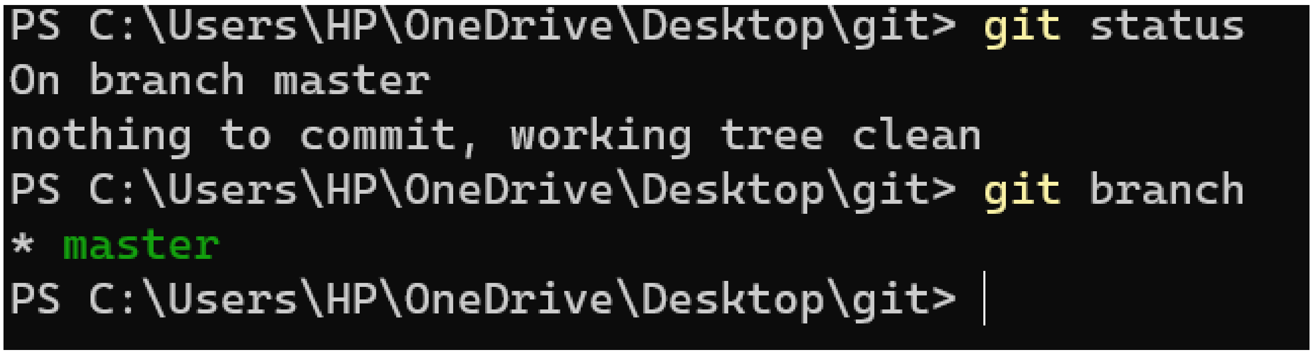
```
git

Name                Date modified       Type            Size

.git                10-04-2022 11:30    File folder
GIT.txt             09-04-2022 21:45    Text Document   2 KB
```



```
PS C:\Users\HP\OneDrive\Desktop\git> git status
fatal: not a git repository (or any of the parent directories): .git
PS C:\Users\HP\OneDrive\Desktop\git> git init
Initialized empty Git repository in C:/Users/HP/OneDrive/Desktop/git/.git/
PS C:\Users\HP\OneDrive\Desktop\git> ls
```



```
PS C:\Users\HP\OneDrive\Desktop\git> ls


    Directory: C:\Users\HP\OneDrive\Desktop\git


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----        09-04-2022     21:45           1061 GIT.txt


PS C:\Users\HP\OneDrive\Desktop\git> git add GIT.txt
PS C:\Users\HP\OneDrive\Desktop\git> git commit -m "ADDED GIT.TXT FILE"
[master (root-commit) d8e1c35] ADDED GIT.TXT FILE
 1 file changed, 20 insertions(+)
 create mode 100644 GIT.txt
PS C:\Users\HP\OneDrive\Desktop\git> git log
commit d8e1c351e5af2c814330dca7e7753aacec572a4d (HEAD -> master)
Author: Aaryan Sood <aaryan0020.be21@chitkara.edu.in>
Date:   Sun Apr 10 11:29:09 2022 +0530

    ADDED GIT.TXT FILE
```



```
PS C:\Users\HP\OneDrive\Desktop\git> git status
On branch master
nothing to commit, working tree clean
PS C:\Users\HP\OneDrive\Desktop\git> git branch
* master
PS C:\Users\HP\OneDrive\Desktop\git>
```

THANKYOU

GITHUB PROFILE :

https://github.com/aaryansood2512chitkara

GITHUB ORGANISATION REPOSITORY LINK:

https://github.com/Group08-Chitkara-University/2110990020