Department of
Computer Science and Engineering

Title: Version Control Part I (Using Git)

Software Testing & Quality Assurance Lab CSE 434

Green University of Bangladesh

1 Objective(s)

- To understand Version control.
- Introduction to Git and its installation process.

2 Version control

Version control, also known as source control, is the practice of tracking and managing changes to software code. Version control systems are software tools that help software teams manage changes to source code over time. As development environments have accelerated, version control systems help software teams work faster and smarter. They are especially useful for developer teams since they help them to reduce development time and increase successful deployments. Version control software keeps track of every modification to the code in a special kind of database. If a mistake is made, developers can turn back the clock and compare earlier versions of the code to help fix the mistake while minimizing disruption to all team members. For almost all software projects, the source code is like the crown jewels - a precious asset whose value must be protected. For most software teams, the source code is a repository of the invaluable knowledge and understanding about the problem domain that the developers have collected and refined through careful effort. Version control protects source code from both catastrophe and the casual degradation of human error and unintended consequences.

3 Introduction to Git

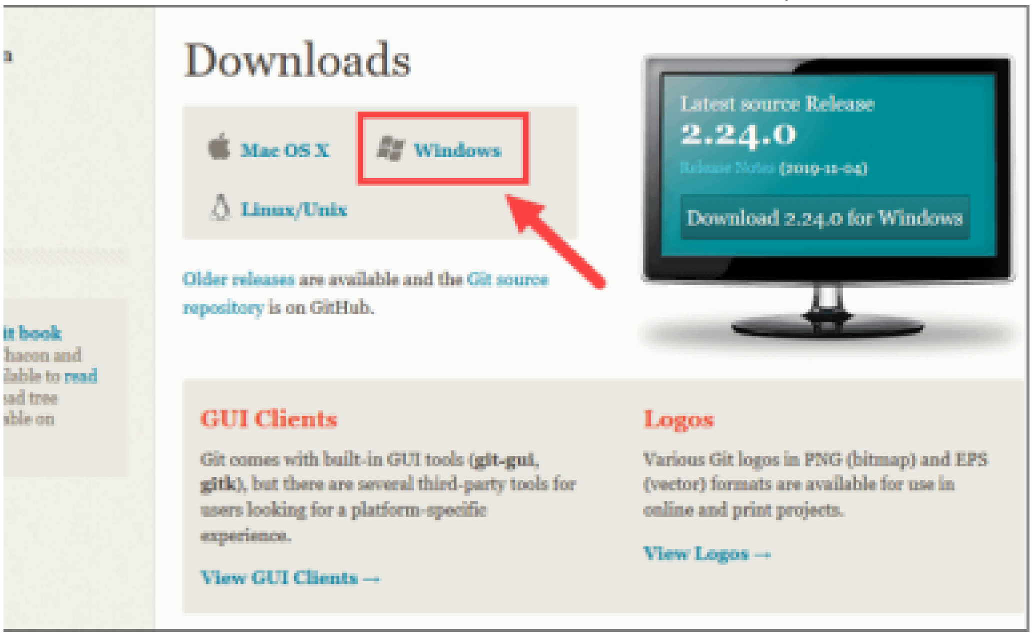
By far, the most widely used modern version control system in the world today is Git. Git is a mature, actively maintained open source project originally developed in 2005 by Linus Torvalds, the famous creator of the Linux operating system kernel. A staggering number of software projects rely on Git for version control, including commercial projects as well as open source. Developers who have worked with Git are well represented in the pool of available software development talent and it works well on a wide range of operating systems and IDEs (Integrated Development Environments).

Having a distributed architecture, Git is an example of a DVCS (hence Distributed Version Control System). Rather than have only one single place for the full version history of the software as is common in once-popular version control systems like CVS or Subversion (also known as SVN), in Git, every developer's working copy of the code is also a repository that can contain the full history of all changes.

In addition to being distributed, Git has been designed with performance, security and flexibility in mind.

4 Steps For Installing Git for Windows

- Step 1: Browse to the official Git website: https://git-scm.com/downloads
- Step 2: Click the download link for Windows and allow the download to complete.



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

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.

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

Figure: 1

- Step 3: Browse to the download location (or use the download shortcut in your browser). Double-click the file to extract and launch the installer.

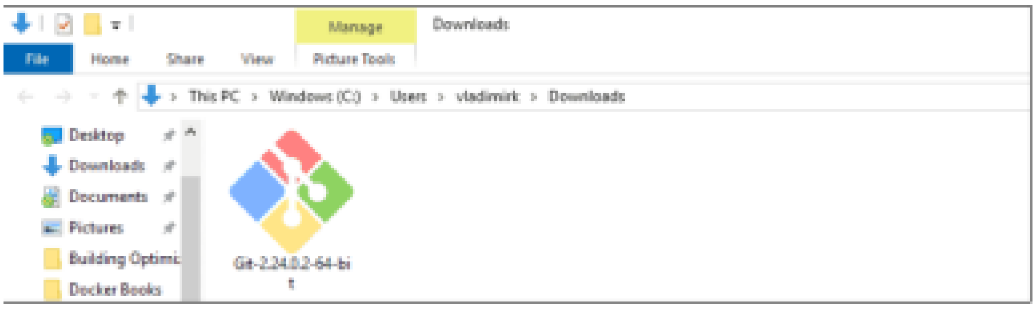
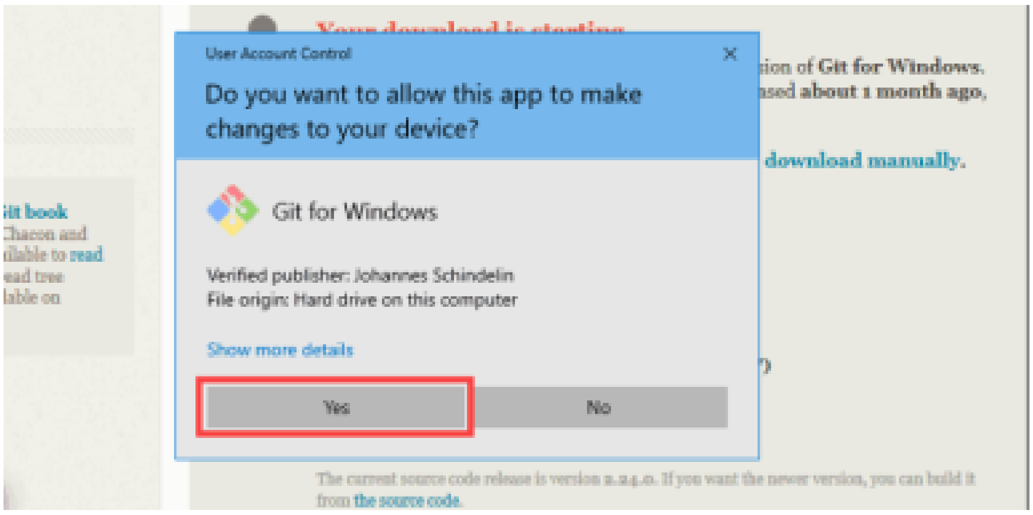


Figure: 2

• Step 4: Allow the app to make changes to your device by clicking Yes on the User Account Control dialog that opens.


User Account Control

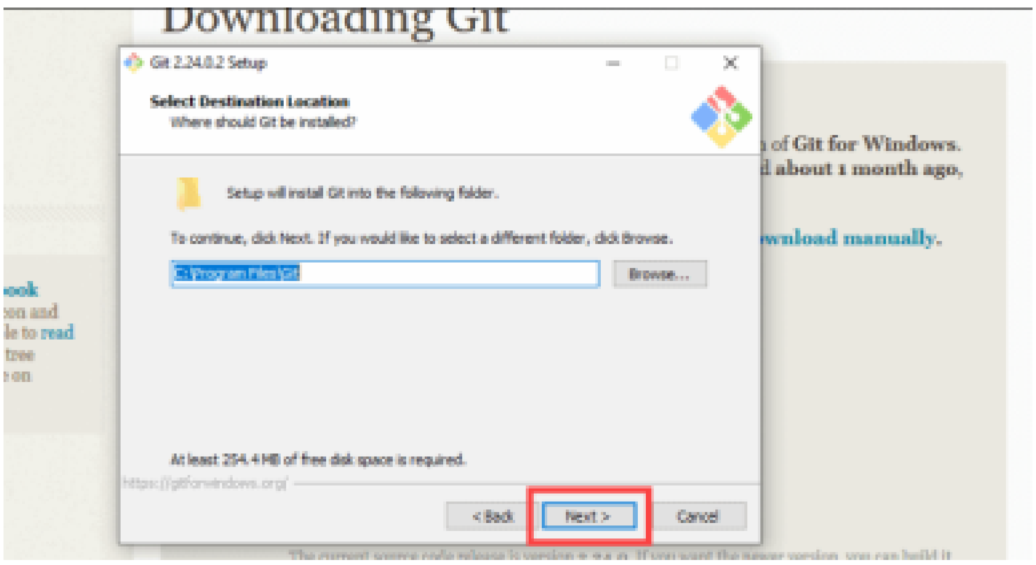
Do you want to allow this app to make changes to your device?

Git for Windows

Verified publisher: Johannes Schindelin
File origin: Hard drive on this computer

Figure: 3

• Step 5: Review the GNU General Public License, and when you're ready to install, click Next.
• Step 6: The installer will ask you for an installation location. Leave the default, unless you have reason to change it, and click Next.


Git 2.24.0.2 Setup

Select Destination Location
Where should Git be installed?

Setup will install Git into the following folder.

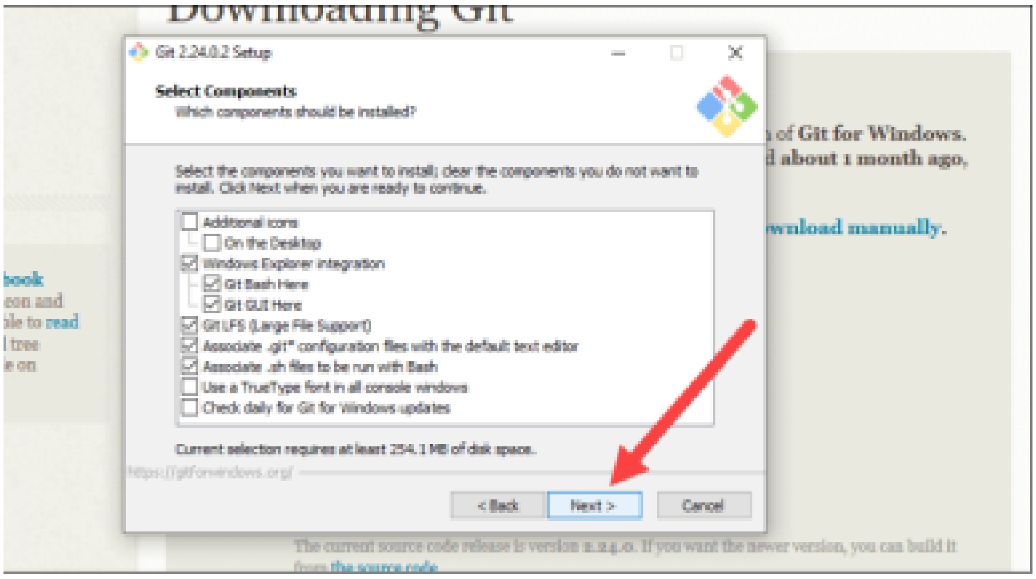
To continue, click Next. If you would like to select a different folder, click Browse.

C:\Program Files\Git

At least 254.4 MB of free disk space is required.

Figure: 4

• Step 7: A component selection screen will appear. Leave the defaults unless you have a specific need to change them and click Next.



Git 2.24.0.2 Setup

Select Components

Which components should be installed?

Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue.

- [ ] Additional icons
  - [ ] On the Desktop
- [✓] Windows Explorer integration
  - [✓] Git Bash Here
  - [✓] Git GUI Here
- [✓] Git LFS (Large File Support)
- [✓] Associate .git* configuration files with the default text editor
- [✓] Associate .sh files to be run with Bash
- [ ] Use a TrueType font in all console windows
- [ ] Check daily for Git for Windows updates

Current selection requires at least 254.1 MB of disk space.

https://gitforwindows.org/

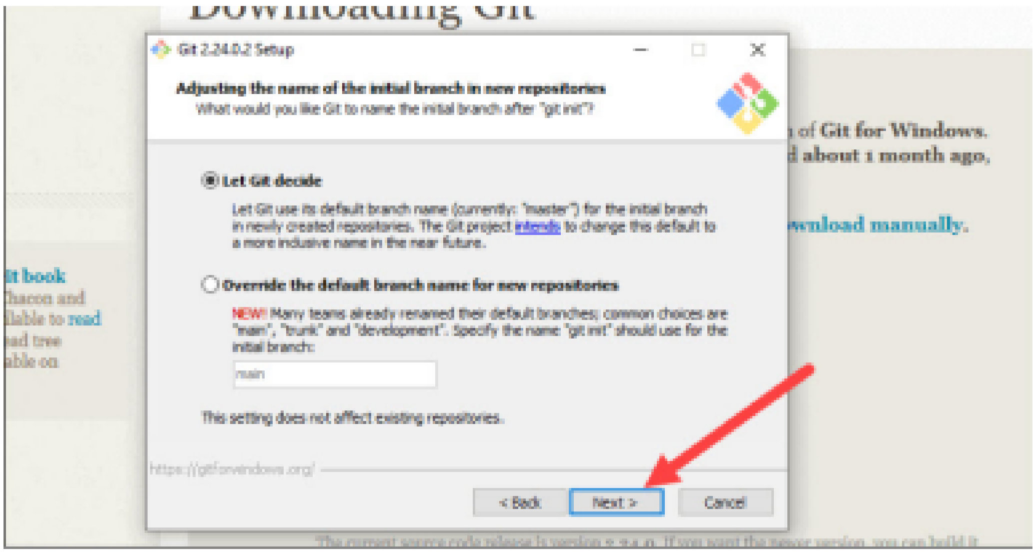
The current source code release is version 2.24.0. If you want the newer version, you can build it from the source code.

Figure: 5

• Step 8: The installer will offer to create a start menu folder. Simply click Next.

• Step 9: Select a text editor you'd like to use with Git. Use the drop-down menu to select Notepad++ (or whichever text editor you prefer) and click Next.

• Step 10: The next step allows you to choose a different name for your initial branch. The default is 'master.' Unless you're working in a team that requires a different name, leave the default option and click Next.



Git 2.24.0.2 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 are "main", "trunk" and "development". Specify the name "git init" should use for the initial branch:

main

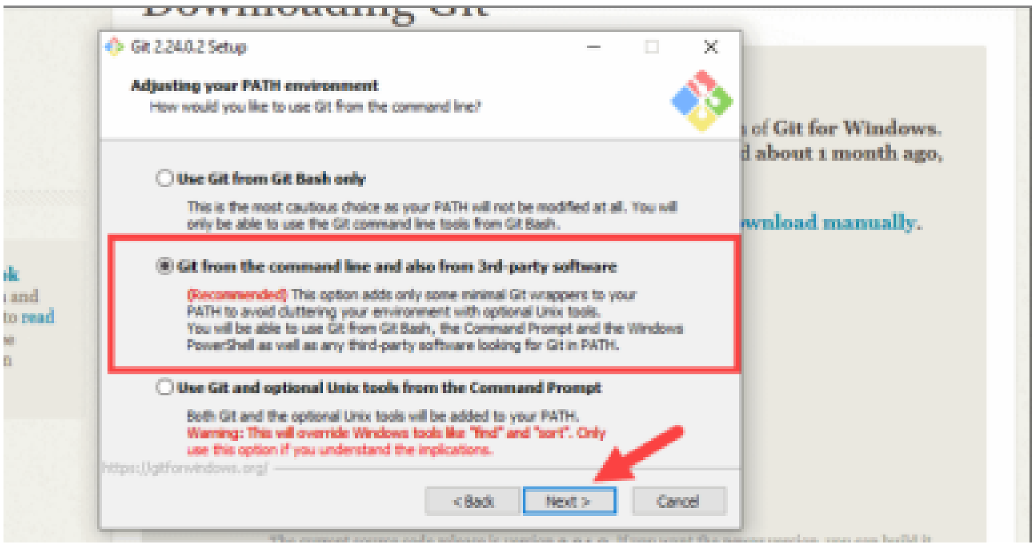
This setting does not affect existing repositories.

https://gitforwindows.org/

The current source code release is version 2.24.0. If you want the newer version, you can build it

Figure: 6

• Step 11: This installation step allows you to change the PATH environment. The PATH is the default set of directories included when you run a command from the command line. Leave this on the middle (recommended) selection and click Next.


Git 2.24.0.2 Setup

Adjusting your PATH environment

How would you like to use Git from the command line?

( ) **Use Git from Git Bash only**

This is the most cautious choice as your PATH will not be modified at all. You will only be able to use the Git command line tools from Git Bash.

[✓ **Git from the command line and also from 3rd-party software**]

(Recommended) This option adds only some minimal Git wrappers to your PATH to avoid cluttering your environment with optional Unix tools. You will be able to use Git from Git Bash, the Command Prompt and the Windows PowerShell as well as any third-party software looking for Git in PATH.

( ) **Use Git and optional Unix tools from the Command Prompt**

Both Git and the optional Unix tools will be added to your PATH. Warning: This will override Windows tools like "find" and "sort". Only use this option if you understand the implications.

Figure: 7

- Step 12: The installer now asks which SSH client you want Git to use. Git already comes with its own SSH client, so if you don't need a specific one, leave the default option and click Next.

- Step 13: The next option relates to server certificates. Most users should use the default. If you're working in an Active Directory environment, you may need to switch to Windows Store certificates. Click Next.

- Step 14: The next selection converts line endings. It is recommended that you leave the default selection. This relates to the way data is formatted and changing this option may cause problems. Click Next.

- Step 15: Choose the terminal emulator you want to use. The default MinTTY is recommended, for its features. Click Next.

- Step 16: The installer now asks what the git pull command should do. The default option is recommended unless you specifically need to change its behavior. Click Next to continue with the installation.

- Step 17: Next you should choose which credential helper to use. Git uses credential helpers to fetch or save credentials. Leave the default option as it is the most stable one, and click Next.
- Step 18: The default options are recommended, however this step allows you to decide which extra option you would like to enable. If you use symbolic links, which are like shortcuts for the command line, tick the box. Click Next.

- Step 19: Depending on the version of Git you're installing, it may offer to install experimental features. At the time this article was written, the options to include support for pseudo controls and a built-in file system monitor were offered. Unless you are feeling adventurous, leave them unchecked and click Install.

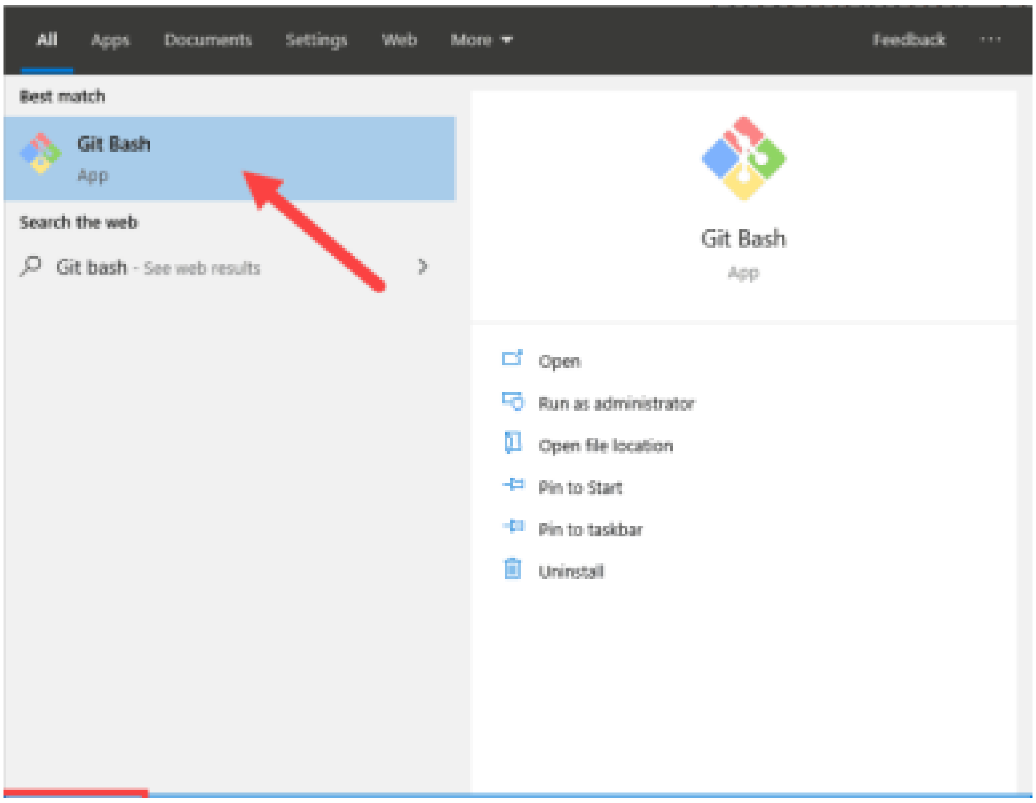
- Step 20: Once the installation is complete, tick the boxes to view the Release Notes or Launch Git Bash, then click Finish.

5 How to Launch Git in Windows

Git has two modes of use – a bash scripting shell (or command line) and a graphical user interface (GUI).

5.1 Launch Git Bash Shell

To launch Git Bash open the Windows Start menu, type git bash and press Enter (or click the application



icon). Figure: 8

5.2 Launch Git GUI

To launch Git GUI open the Windows Start menu, type git gui and press Enter (or click the application icon).

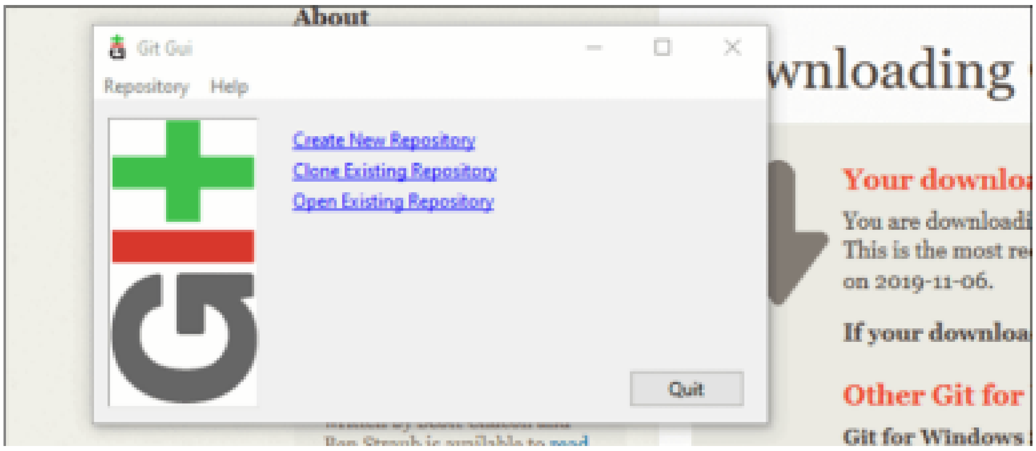


Figure: 9

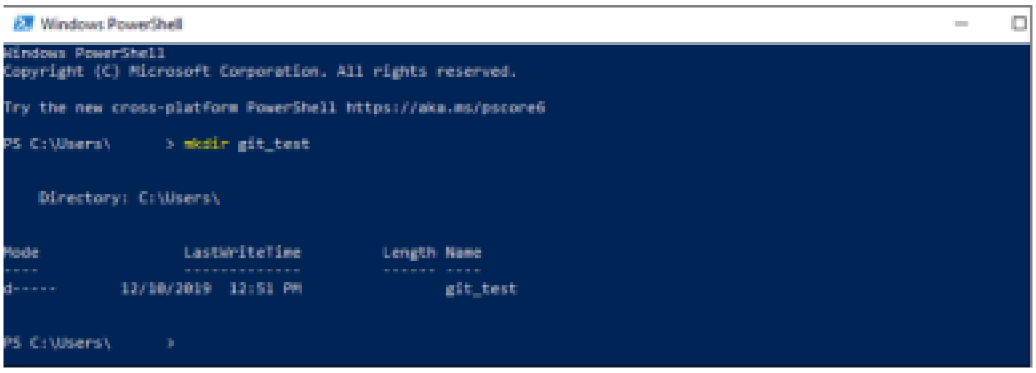
6 Connecting to a Remote Repository

You need a GitHub username and password for this next step.

6.1 Create a Test Directory

Open a Windows PowerShell interface by pressing Windows Key + x, and then i once the menu appears. Create a new test directory (folder) by entering the following: mkdir git-test

An example of the PowerShell output.



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\      > mkdir git_test


    Directory: C:\Users\


Mode                LastWriteTime         Length Name
----                -------------         ------ ----
d-----       12/10/2019  12:51 PM                git_test


PS C:\Users\      >
```

Figure: 10

Change your location to the newly created directory: cd git-test

Note: If you already have a GitHub repository, use the name of that project instead of git-test.

6.2 Configure GitHub Credentials

Configure your local Git installation to use your GitHub credentials by entering the following:
git config –global user.name "github-username"
git config –global user.email "email-address"

Note: Replace github-username and email-address with your GitHub credentials.

6.3 Pushing Local Files to the Remote Repository

Once you have done some work on the project, you may want to submit those changes to the remote project on GitHub.

1. For example, create a new text file by entering the following into your PowerShell window:new-item text.txt.
2. Confirmation that the new file is created.
3. Now check the status of your new Git branch and untracked files:git status.
4. Add your new file to the local project:git add text.txt.
5. Run git status again to make sure the text.txt file has been added. Next, commit the changes to the local project:git commit -m "Sample 1".
6. Finally, push the changes to the remote GitHub repository:git push

7 Lab Task (Please implement yourself and show the output to the instructor)

1. Create a new file to your local project and push to remote GitHub repository.

8 Lab Exercise (Submit as a report)

1. Create a new branch in Git.

9 Policy

Copying from internet, classmate, seniors, or from any other source is strongly prohibited. 100% marks will be *deducted* if any such copying is detected.

10 Resources

https://phoenixnap.com/kb/how-to-install-git-windows