Experiment 02 - Version Control

Roll No.	37
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Class	D15-A
Subject	DevOps Lab
LO Mapped	LO1: To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements LO2: To obtain complete knowledge of the "version control system" to effectively track changes augmented with Git and GitHub

Aim: To understand Version Control System / Source Code Management, install git and create a GitHub account.

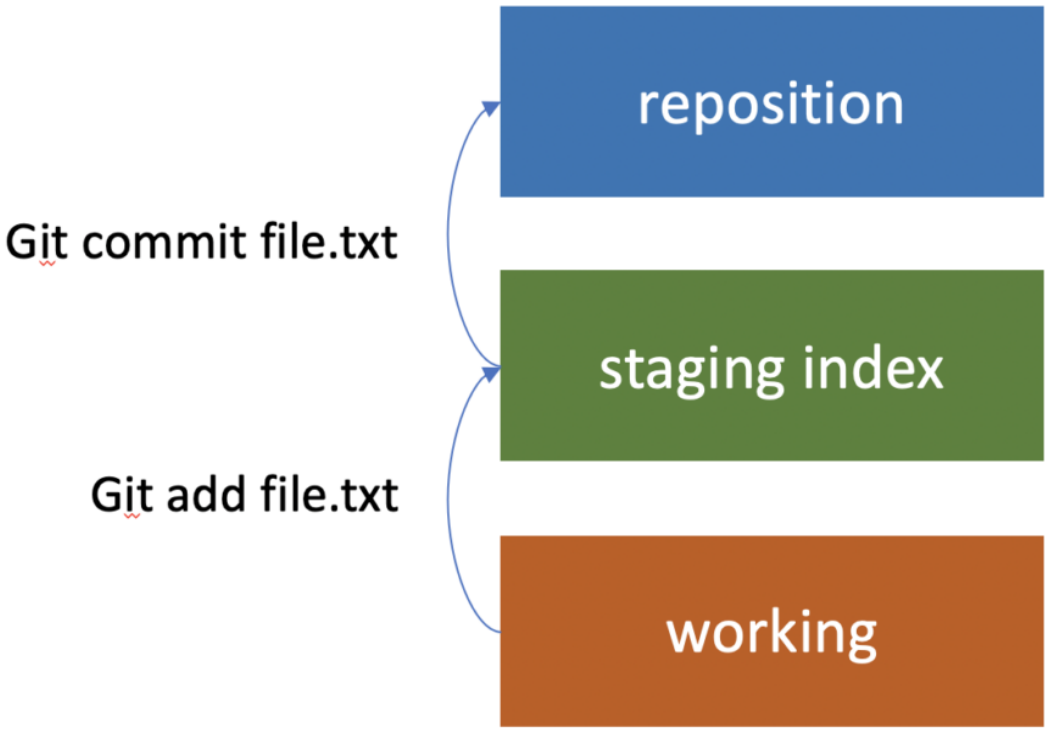
Introduction:

The purpose of version control is to allow software teams to track changes to the code while enhancing communication and collaboration between team members. Version control facilitates a continuous, simple way to develop software.
Source code acts as a single source of truth and a collection of a product's knowledge, history, and solutions. Version control (or code revision control) serves as a safety net to protect the source code from irreparable harm, giving the development team the freedom to experiment without fear of causing damage or creating code conflicts.
Suppose developers code concurrently and make incompatible changes. In that case, version control identifies the problem areas so that team members can quickly revert changes to a previous version, compare changes, or identify who committed the problem code through the revision history. With version control systems, a software team can solve an issue before progressing further into a project. Software teams can analyze earlier versions through code reviews to understand how a solution evolved.
Depending on a team's specific needs, a version control system can be local, centralized, or distributed. A local version control system stores files within a local system. Centralized version control stores changes in a single server. A distributed version control system involves cloning a Git repository.

Git:

Git uses a three-tree architecture.
It has the repository and the working copy, but in between is another tree, which is the staging index. When we made our first commit, we didn't just perform a commit. First, we used the add command. We added, then we committed. It was a two-step process (added our files to the staging index, and then from there we committed to the repository).

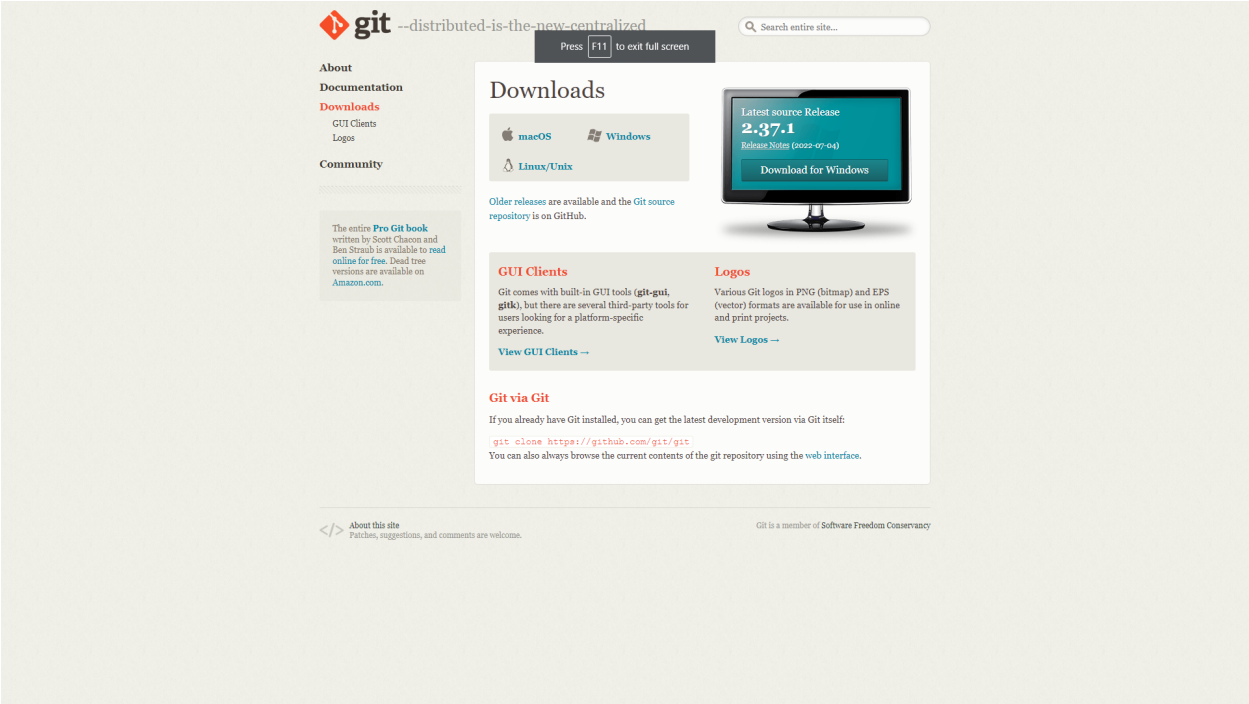
Git Concepts and Architecture-



It is possible to just commit directly to the repository and skip adding them to the staging index. But it's important to understand that this is part of the architecture of Git. It's a really nice feature because we can make changes to ten different files in our working copy, and then selectively commit five of the changes as one set. That's why it's called staging. We have the chance to add the changes that we want to the staging, and then get them ready before we commit them. And we can check out changes from the repository the same way.
It's also possible to pull them from the repository into the staging index, and then from the staging index to the working directory, but most of the time, that's not what we do. Usually, we go ahead and pull them straight from the repository, down into the working directory. In the process, the staging index will also be updated too.
As we're working with Git, it's useful to keep these three different trees in mind. There's our working directory, which contains changes that may not be tracked by Git yet, there's the staging index, which contains changes that we're about to commit into the repository, and then there's the repository, and that's what's actually being tracked by Git.

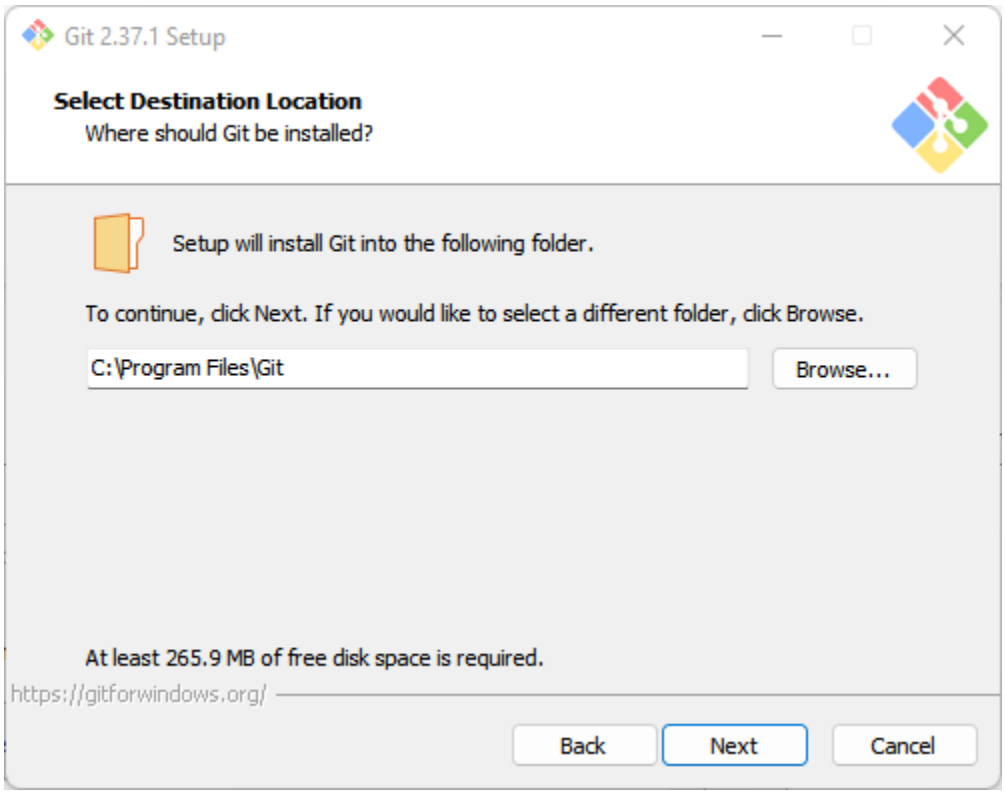
Installation:

1. Search git download on browser and open 1st link and download the version of git relevant for your OS.

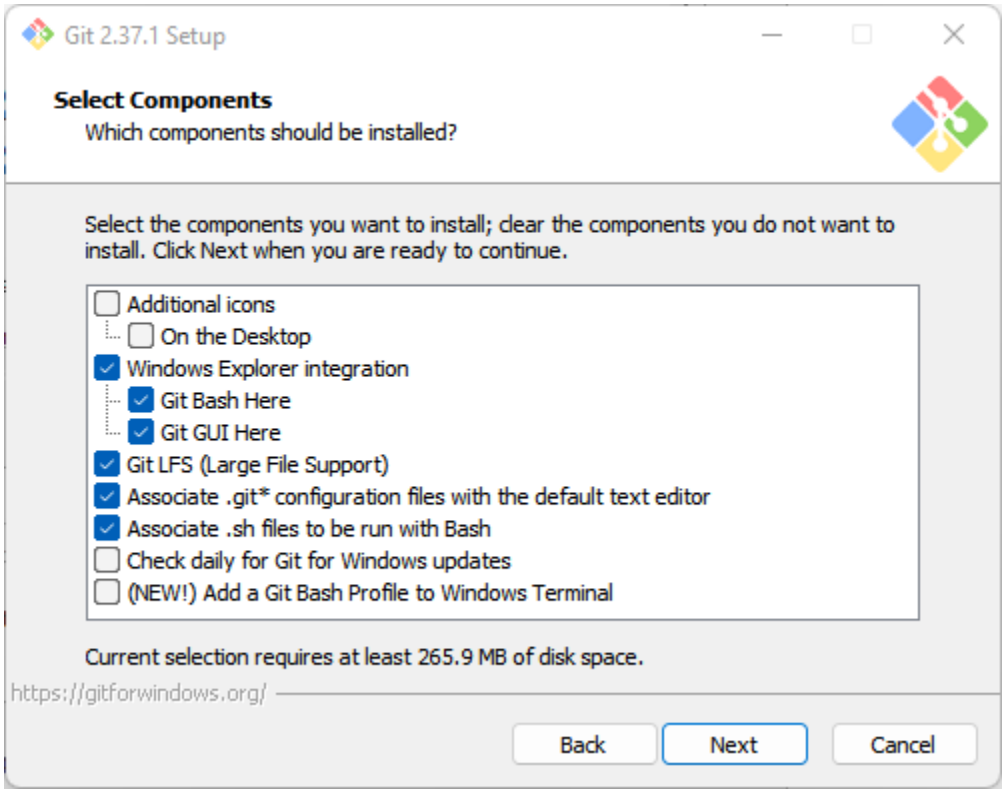


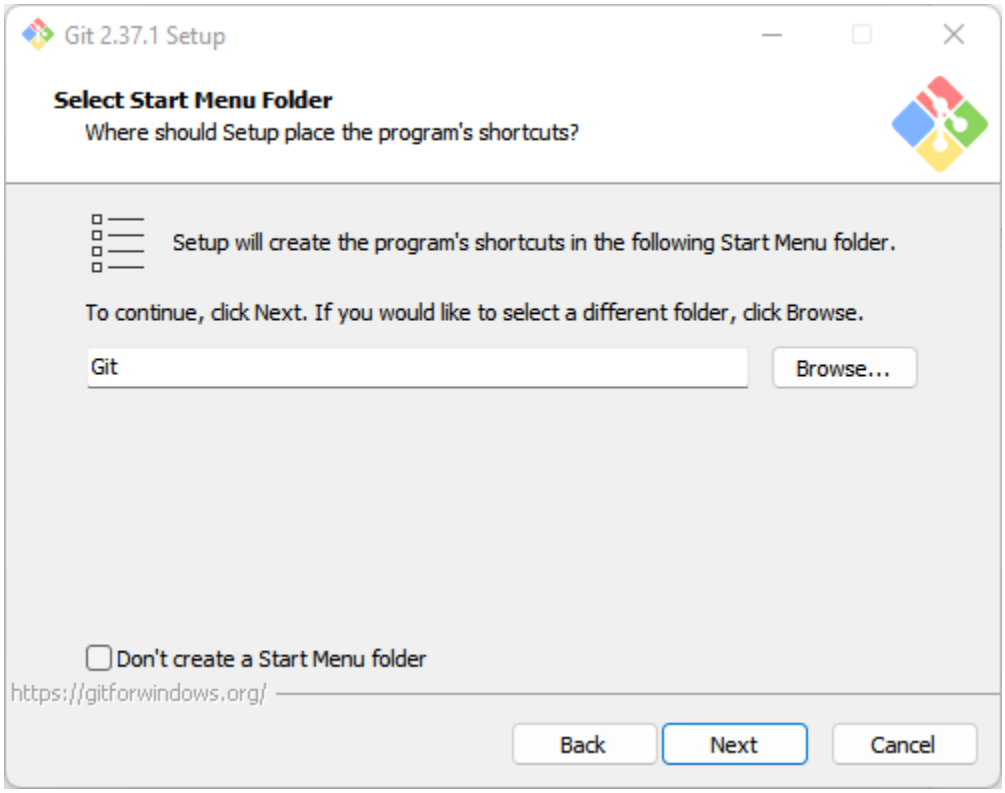
2. Run the setup and click on next.

3. Specify the location where you want to install Git and click next.

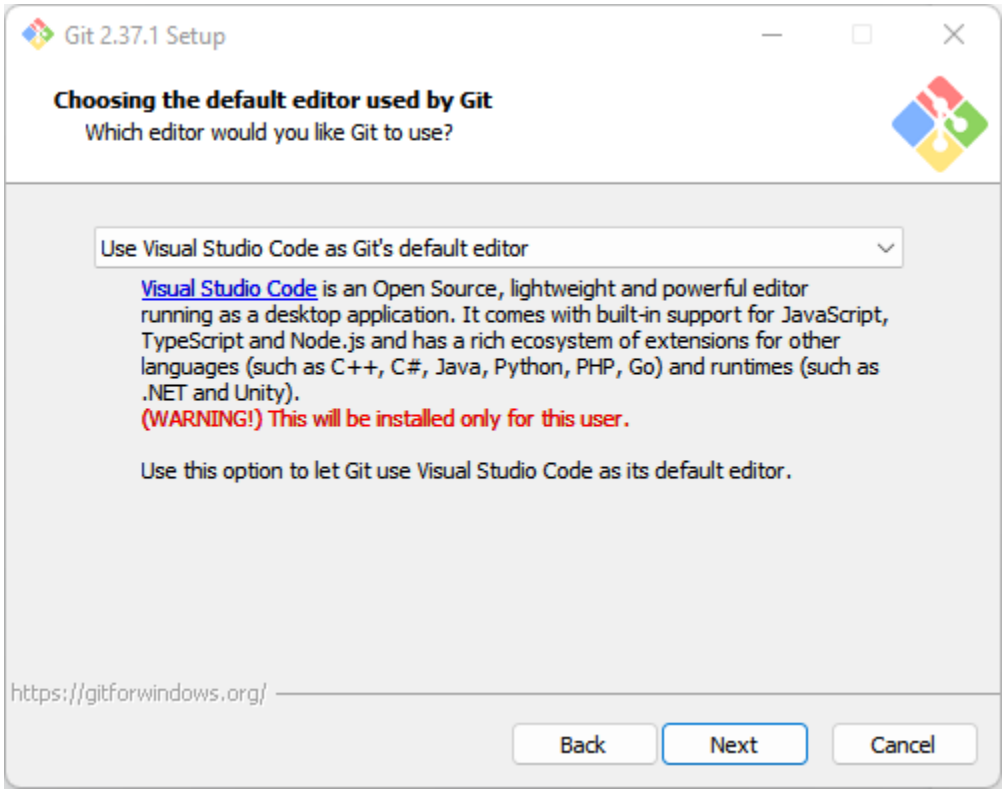


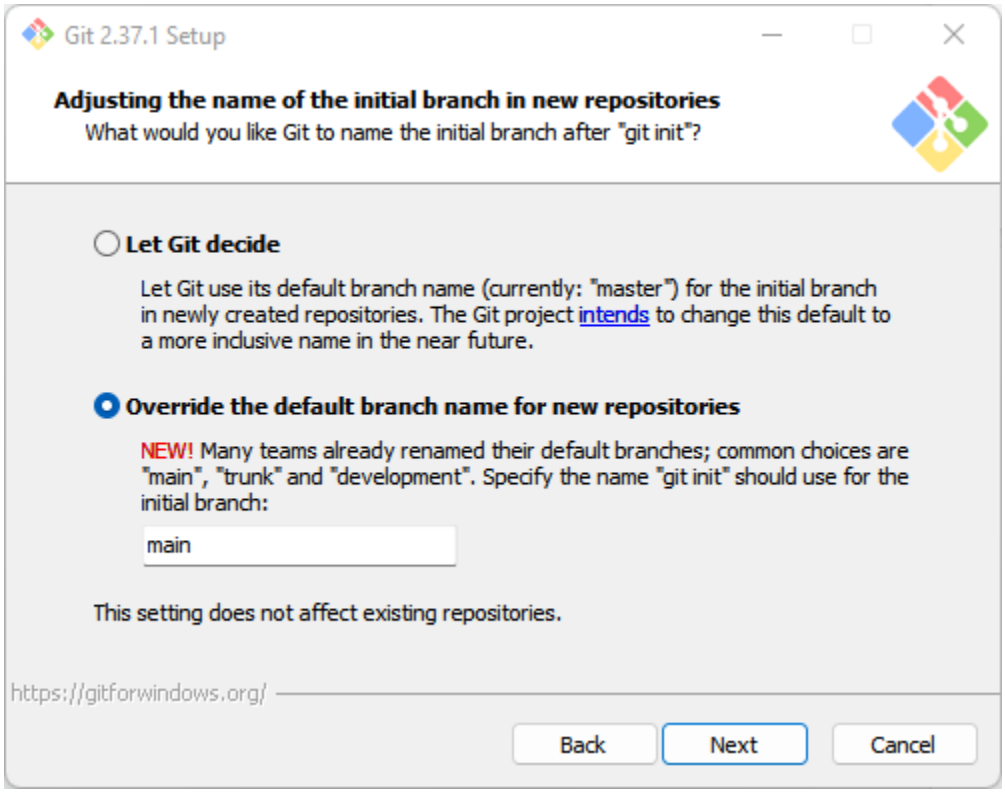
3. Click on the next till you install button.





4. We can make VSCode our default editor.




Git 2.37.1 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/
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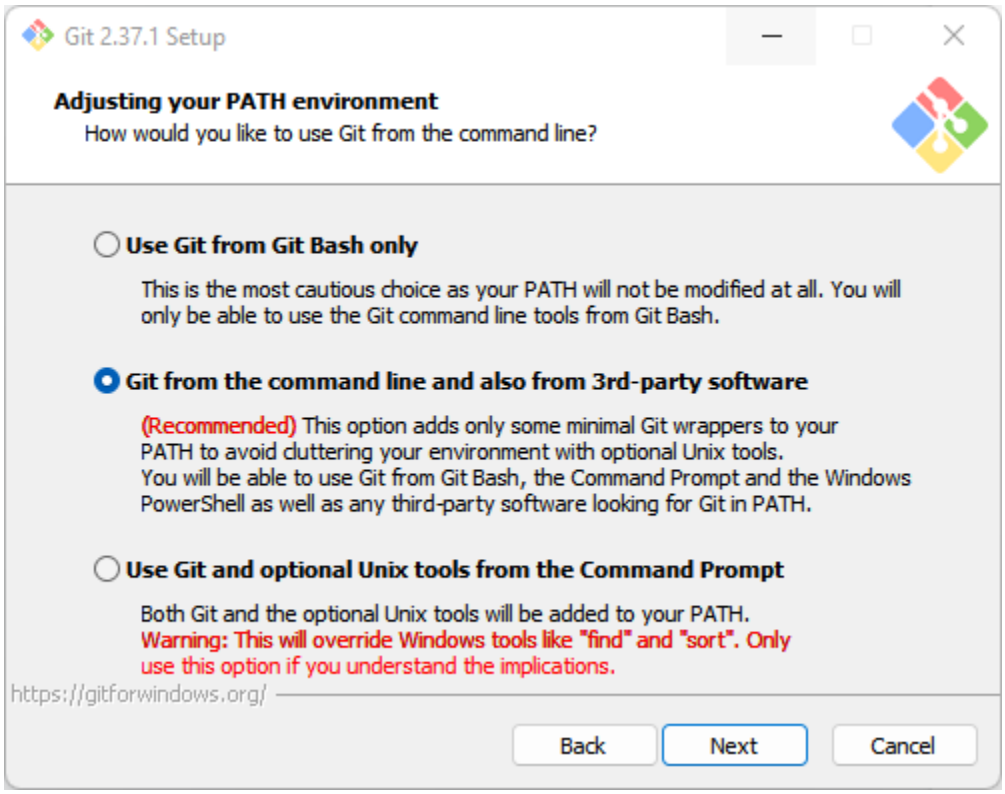
Git 2.37.1 Setup
Adjusting your PATH environment
How would you like to use Git from the command line?
Use Git from Git Bash only
This is the most cautious choice as your PATH will not be modified at all. You will only be able to use the Git command line tools from Git Bash.
Git from the command line 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.
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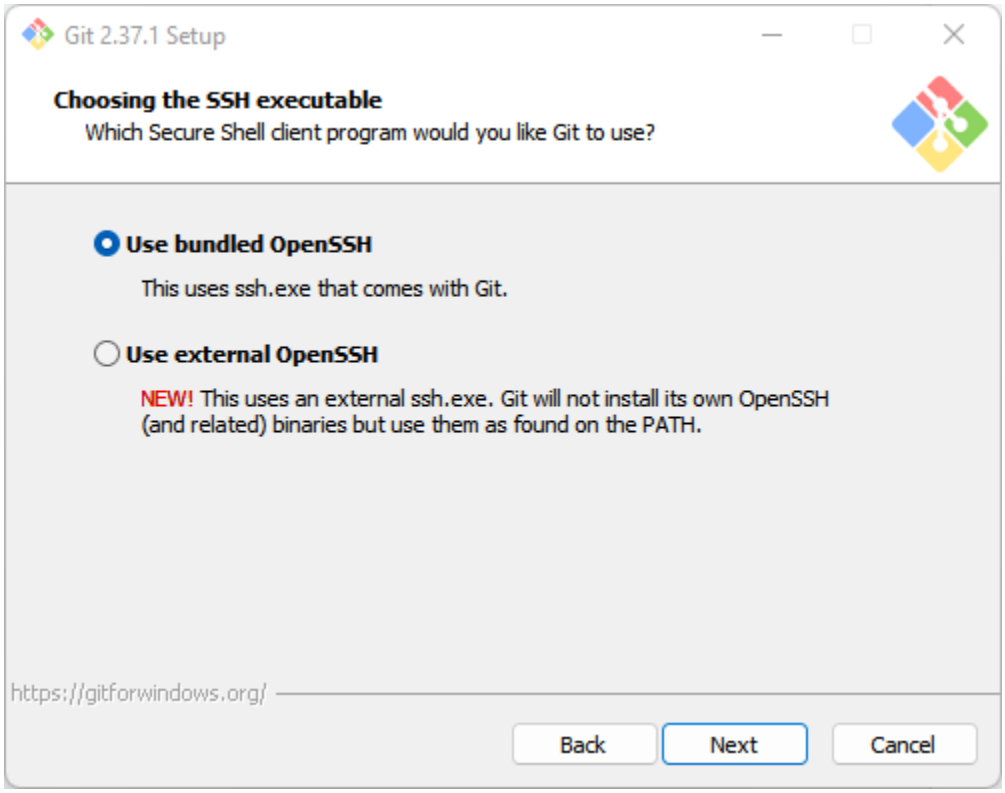
Git 2.37.1 Setup
Choosing the SSH executable
Which Secure Shell client program would you like Git to use?
Use bundled OpenSSH
This uses ssh.exe that comes with Git.
Use external OpenSSH
NEW! This uses an external ssh.exe. Git will not install its own OpenSSH (and related) binaries but use them as found on the PATH.
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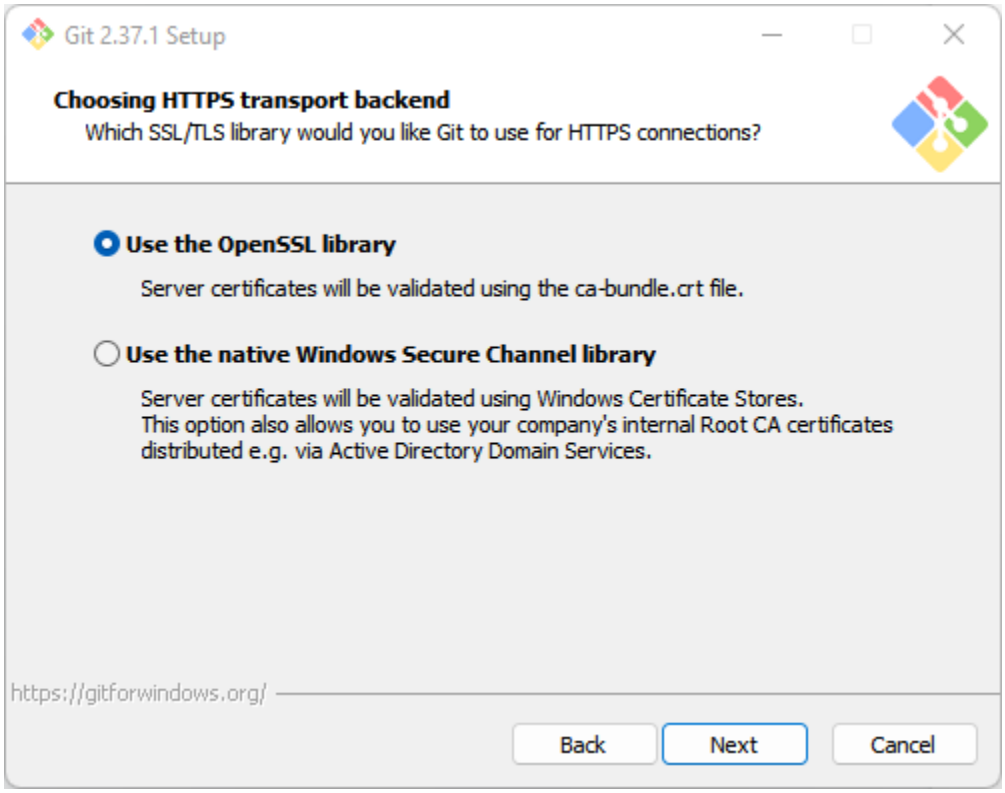
Git 2.37.1 Setup
Choosing HTTPS transport backend
Which SSL/TLS library would you like Git to use for HTTPS connections?
Use the OpenSSL library
Server certificates will be validated using the ca-bundle.crt file.
Use the native Windows Secure Channel library
Server certificates will be validated using Windows Certificate Stores.
This option also allows you to use your company's internal Root CA certificates distributed e.g. via Active Directory Domain Services.
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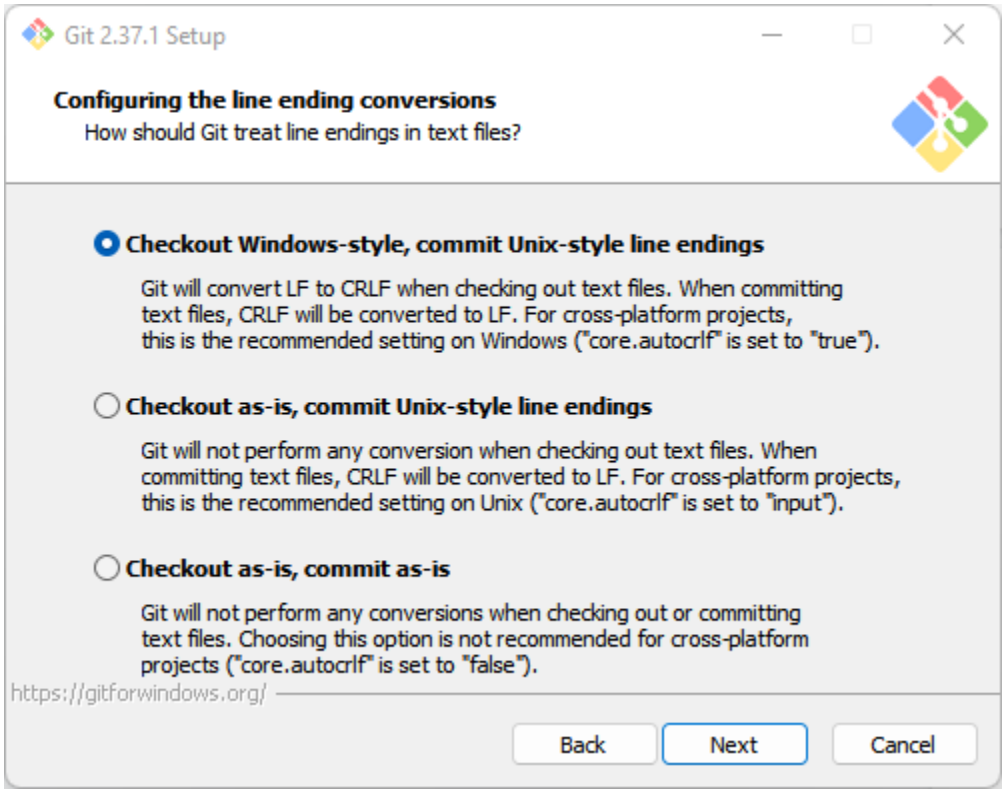
Git 2.37.1 Setup
Configuring the line ending conversions
How should Git treat line endings in text files?
Checkout Windows-style, commit Unix-style line endings
Git will convert LF to CRLF when checking out text files. When committing text files, CRLF will be converted to LF. For cross-platform projects, this is the recommended setting on Windows ("core.autocrlf" is set to "true").
Checkout as-is, commit Unix-style line endings
Git will not perform any conversion when checking out text files. When committing text files, CRLF will be converted to LF. For cross-platform projects, this is the recommended setting on Unix ("core.autocrlf" is set to "input").
Checkout as-is, commit as-is
Git will not perform any conversions when checking out or committing text files. Choosing this option is not recommended for cross-platform projects ("core.autocrlf" is set to "false").
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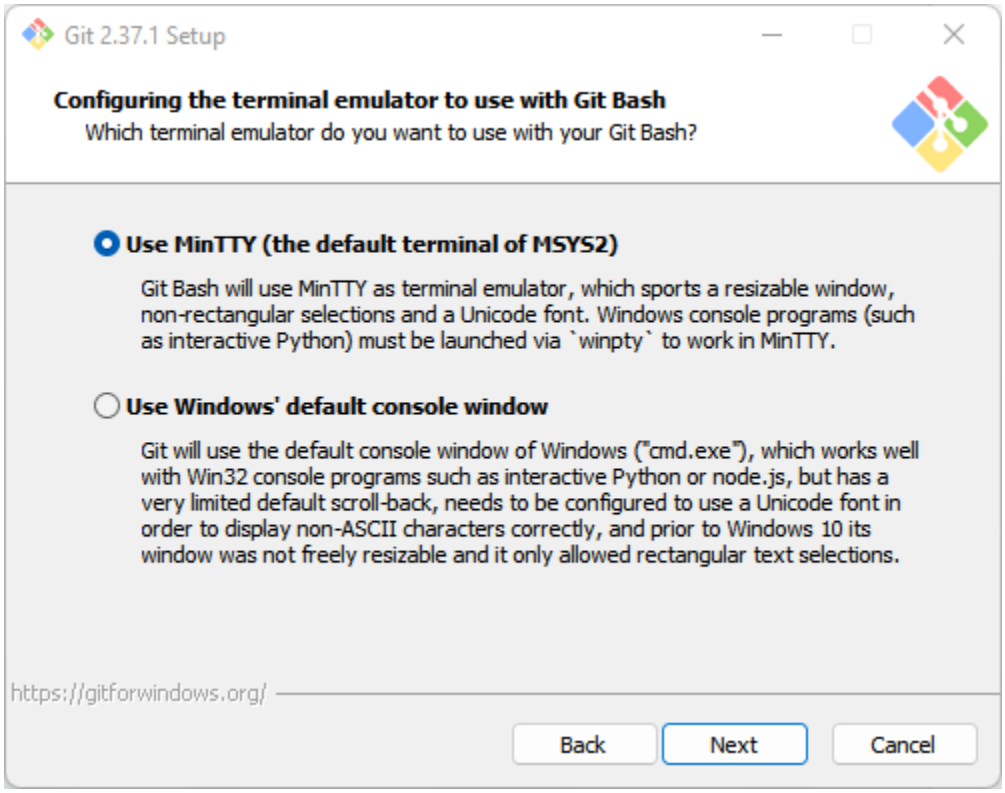
Git 2.37.1 Setup
Configuring the terminal emulator to use with Git Bash
Which terminal emulator do you want to use with your Git Bash?
Use MinTTY (the default terminal of MSYS2)
Git Bash will use MinTTY as terminal emulator, which sports a resizable window, non-rectangular selections and a Unicode font. Windows console programs (such as interactive Python) must be launched via `winpty` to work in MinTTY.
Use Windows' default console window
Git will use the default console window of Windows ("cmd.exe"), which works well with Win32 console programs such as interactive Python or node.js, but has a very limited default scroll-back, needs to be configured to use a Unicode font in order to display non-ASCII characters correctly, and prior to Windows 10 its window was not freely resizable and it only allowed rectangular text selections.
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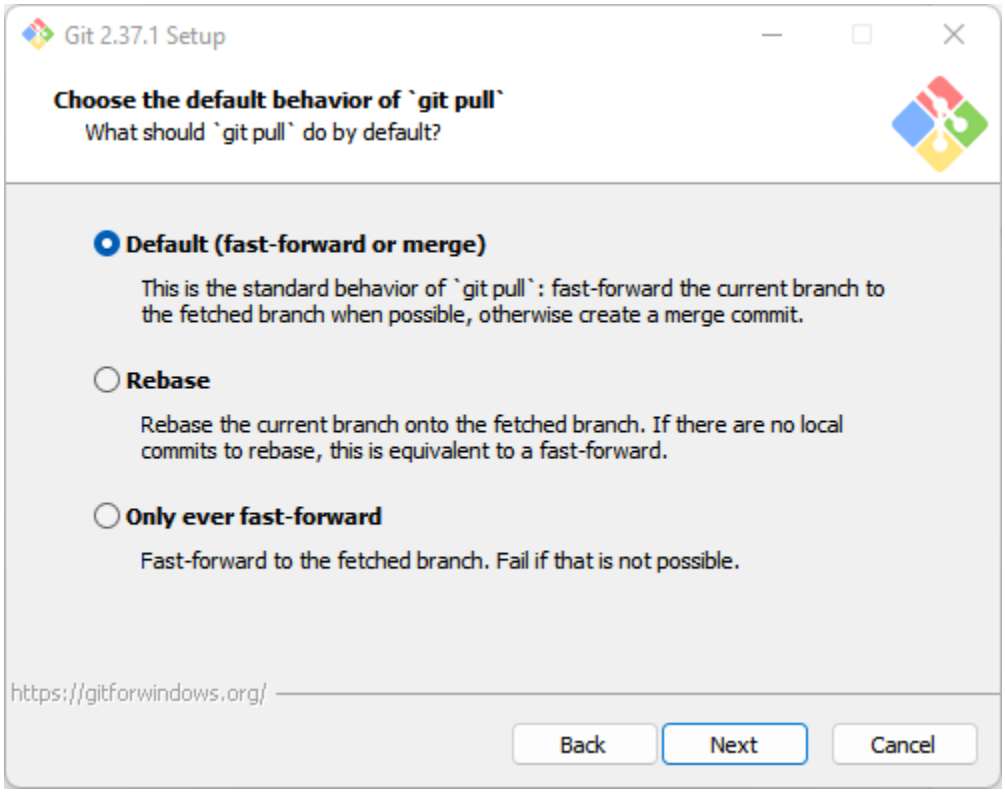
Git 2.37.1 Setup
Choose the default behavior of `git pull`
What should `git pull` do by default?
Default (fast-forward or merge)
This is the standard behavior of `git pull`: fast-forward the current branch to the fetched branch when possible, otherwise create a merge commit.
Rebase
Rebase the current branch onto the fetched branch. If there are no local commits to rebase, this is equivalent to a fast-forward.
Only ever fast-forward
Fast-forward to the fetched branch. Fail if that is not possible.
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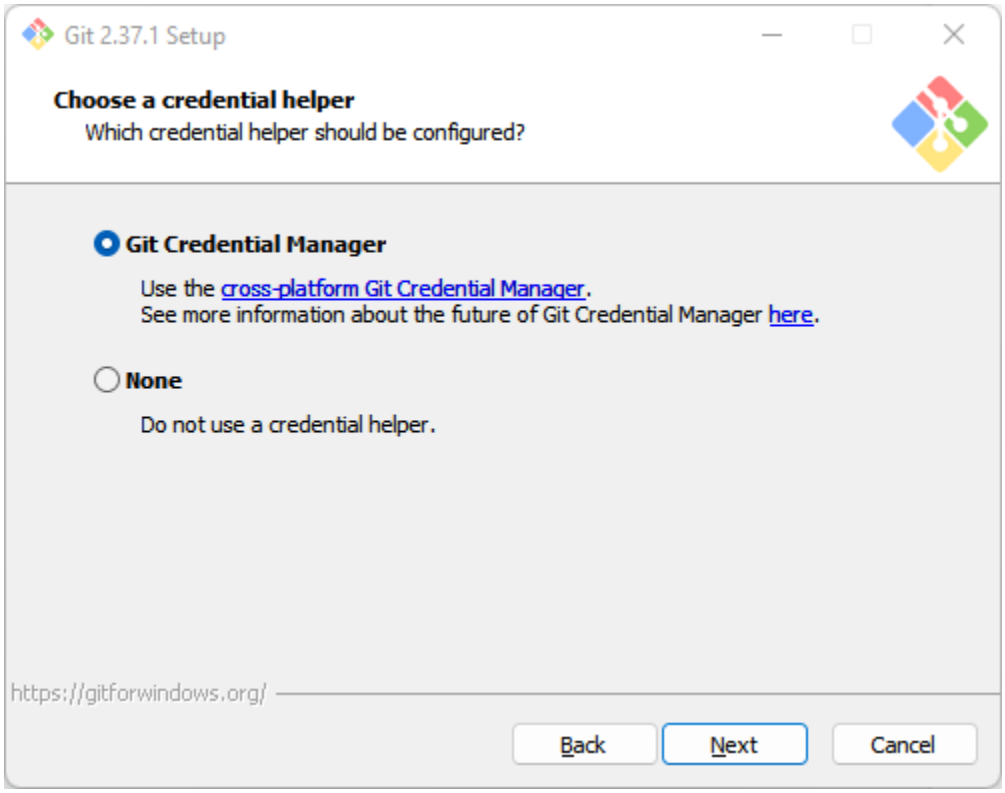
Git 2.37.1 Setup
Choose a credential helper
Which credential helper should be configured?
Git Credential Manager
Use the cross-platform Git Credential Manager.
See more information about the future of Git Credential Manager here.
None
Do not use a credential helper.
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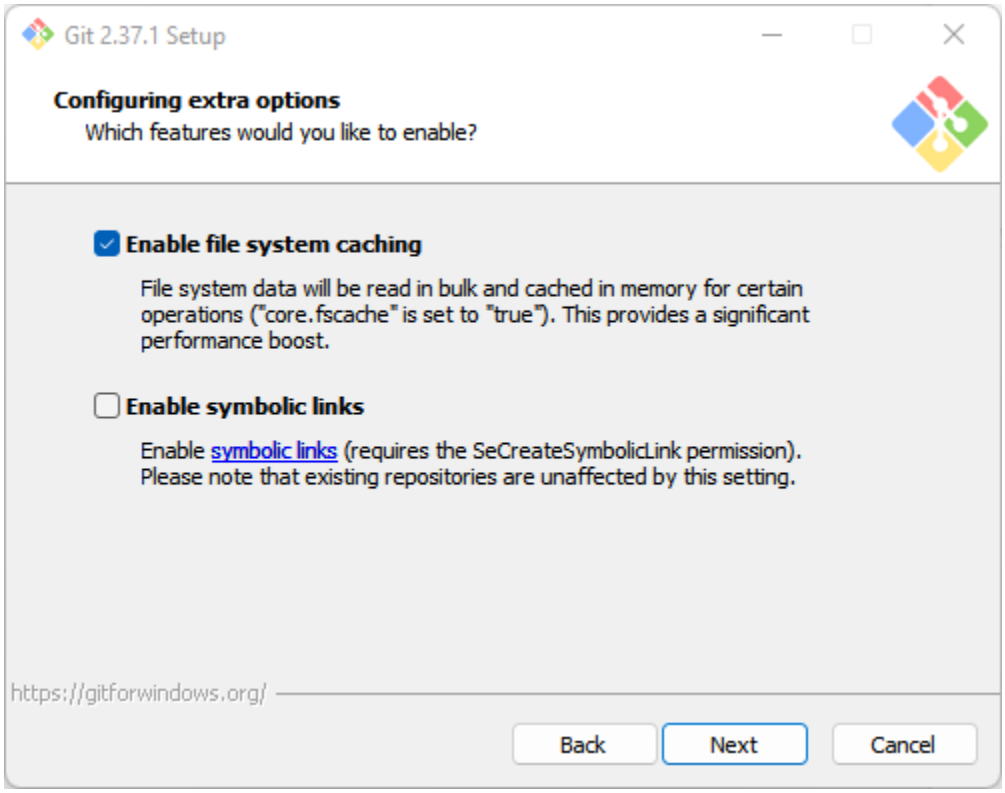
Git 2.37.1 Setup
Configuring extra options
Which features would you like to enable?
Enable file system caching
File system data will be read in bulk and cached in memory for certain operations ("core.fscache" is set to "true"). This provides a significant performance boost.
Enable symbolic links
Enable symbolic links (requires the SeCreateSymbolicLink permission). Please note that existing repositories are unaffected by this setting.
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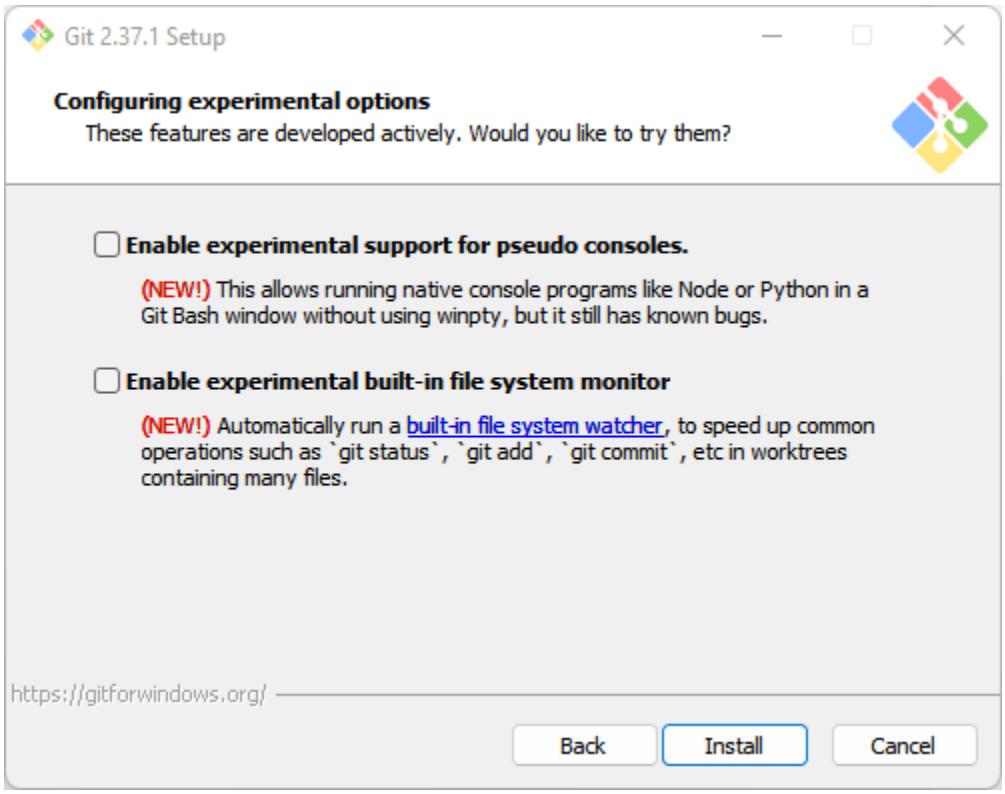
Git 2.37.1 Setup
Configuring experimental options
These features are developed actively. Would you like to try them?
Enable experimental support for pseudo consoles.
(NEW!) This allows running native console programs like Node or Python in a Git Bash window without using winpty, but it still has known 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/
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Install
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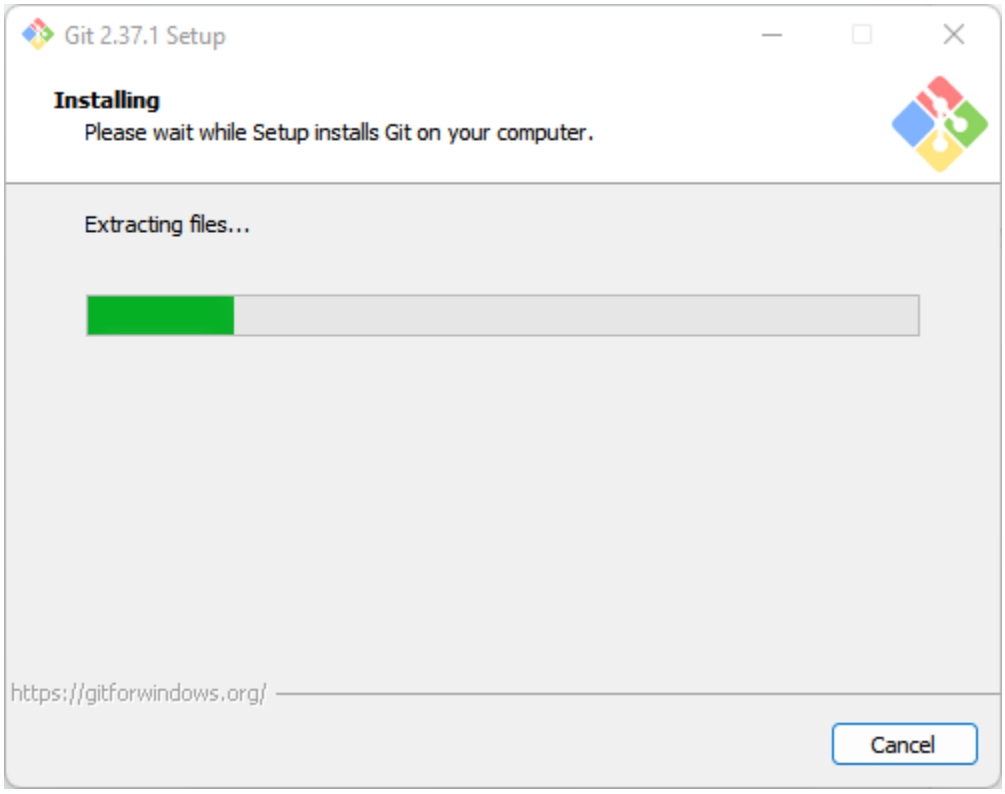
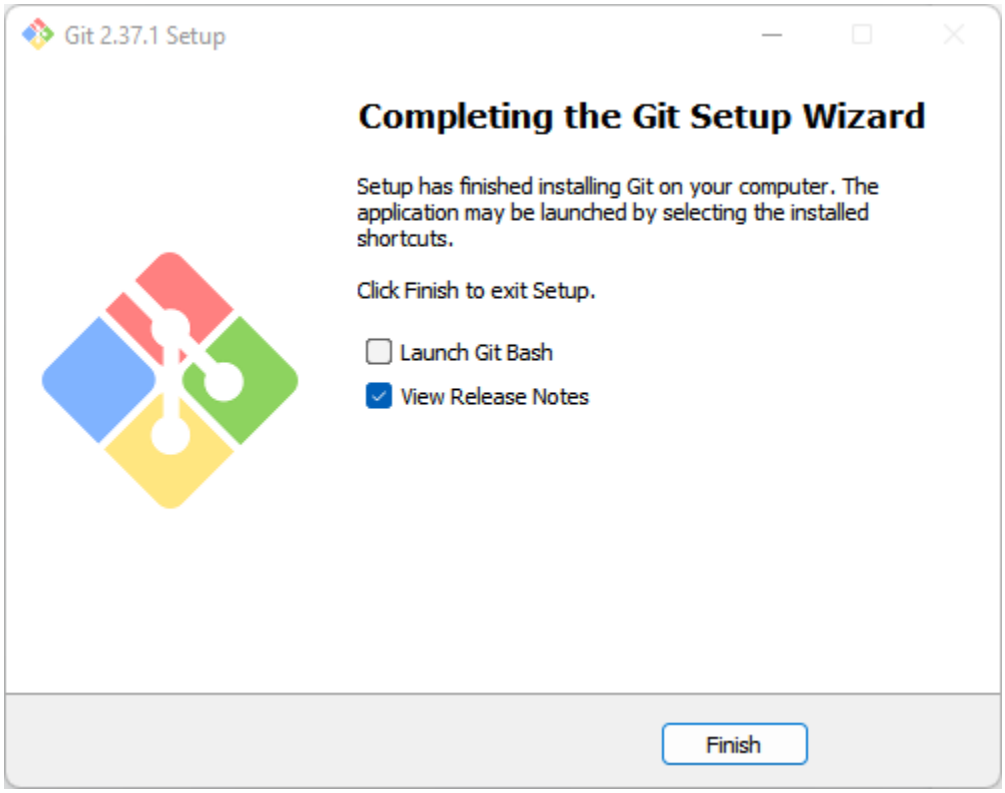
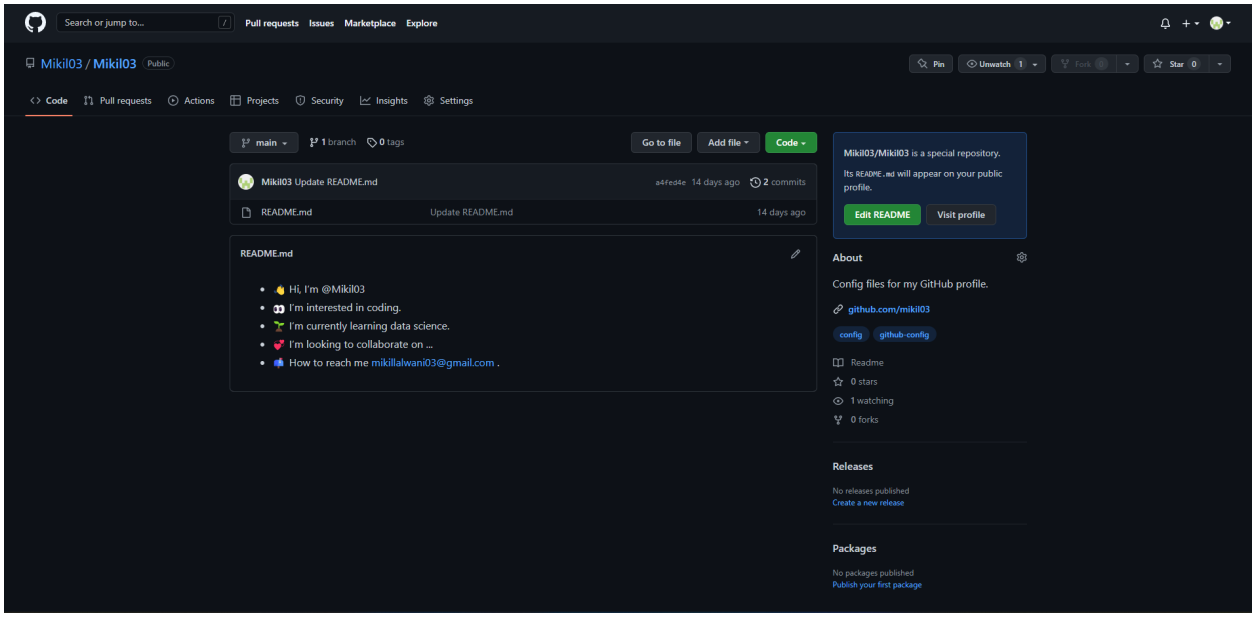


5. Click on finish and now you can start using git.



Github:



Conclusion

We have successfully installed git and created our GitHub account.