# 1.GIT-HOL

# A Detailed Guide to Your First Git Repository

This document provides a comprehensive, step-by-step walkthrough of the fundamental Git commands. It expands on the provided lab instructions to ensure a deep understanding of each concept, from local repository initialization to pushing your work to a remote server on GitLab.

## Objective: Core Git Competency

By the end of this tutorial, you will be proficient in the essential Git workflow. You will understand and be able to use the following commands and concepts:

* **Configuration:** git config
* **Repository Initialization:** git init
* **Status Checking:** git status
* **Staging Files:** git add
* **Committing Changes:** git commit
* **Pushing to a Remote:** git push
* **Pulling from a Remote:** git pull

## Step 1: Initial Git Setup and Configuration

Before you can start versioning your projects, you need to introduce yourself to Git. This configuration step associates your name and email with every commit you make, which is crucial for tracking contributions in collaborative environments.

### 1.1. Verify Git Installation

First, ensure that Git is correctly installed on your machine.

* **Action:** Open the Git Bash terminal.
* **Command:**  
  git --version
* **Explanation:** This command asks Git to report its installed version.
* **Expected Output:** You should see a line of text indicating the version number, for example: git version 2.37.2.windows.1. If you see this, Git is installed correctly. If you get an error like "command not found," you must install the Git client before proceeding.

### 1.2. Create a GitLab Account and Project

A remote repository acts as a central storage location for your project, accessible from any computer. We will use GitLab for this lab.

* **Action:**
  1. Go to [GitLab.com](https://gitlab.com) and sign up for a new, free account. **Note:** As per the instructions, use a personal email, not a corporate one.
  2. After logging in, create a new project. Click the "New project" button.
  3. Choose "Create blank project."
  4. Name your project **GitDemo**.
  5. You can leave the other settings as default for now (e.g., keep it "Private").
  6. Click "Create project." You will be taken to your new, empty project page.

### 1.3. Configure Your Git Identity

Now, let's configure your local Git installation with the same identity you used for GitLab.

* **Action:** In your Git Bash terminal, execute the following commands one by one, replacing the placeholder text with your actual name and email.
* **Commands:**  
  git config --global user.name "Your Name"  
  git config --global user.email "youremail@example.com"
* **Explanation:**
  + git config: This is the command for setting Git configuration variables.
  + --global: This flag tells Git to apply this configuration to every repository on your system. You can also set configurations on a per-repository basis by omitting this flag.
  + user.name and user.email: These are the specific variables we are setting. They are used to label your commits.

### 1.4. Verify Your Configuration

Let's double-check that the configuration was set correctly.

* **Action:** Run the following command in Git Bash.
* **Command:**  
  git config --list
* **Explanation:** This command displays all the global and local configuration settings.
* **Expected Output:** You will see a list of all configurations. Scroll through it and confirm that user.name and user.email are set to the values you provided in the previous step.

## Step 2: Integrating a Default Text Editor (Notepad++)

When you perform certain Git commands, like git commit, Git will open a text editor to allow you to type in a commit message. By default, this might be a command-line editor like Vim, which can be confusing for new users. This step shows you how to set a more user-friendly editor, like Notepad++, as the default.

### 2.1. Make Notepad++ Accessible from Git Bash

Git Bash needs to know where to find the Notepad++ program. This is done by adding its location to the system's PATH variable.

* **Action:**
  1. Find the installation directory for Notepad++. It's usually C:\Program Files\Notepad++.
  2. Go to Control Panel -> System -> Advanced System Settings.
  3. Click on the "Environment Variables..." button.
  4. In the "User variables" section, find the Path variable and click "Edit...".
  5. Click "New" and paste the path to your Notepad++ directory (e.g., C:\Program Files\Notepad++).
  6. Click OK on all the windows to save the changes.
* **Verification:** Close your Git Bash terminal and open a new one. This is important, as terminals only load the PATH variable on startup. Type notepad++ and press Enter. Notepad++ should launch.

### 2.2. Configure Git to Use Notepad++

Now, explicitly tell Git to use Notepad++ as its core editor.

* **Action:** Execute the following command in Git Bash.
* **Command:**  
  git config --global core.editor "notepad++ -multiInst -notabbar -nosession -noPlugin"
* **Explanation:**
  + core.editor: This is the configuration variable for the default text editor.
  + "notepad++ ...": We are setting the value to be the command to run Notepad++. The flags (-multiInst, -notabbar, etc.) are recommended settings that ensure Git can open and close the editor smoothly for operations like writing commit messages.

### 2.3. Verify the Editor Configuration

Let's check that Git now recognizes Notepad++ as its editor.

* **Action:** Run the configuration check command again, but this time specifically for the editor.
* **Command:**  
  git config --global -e
* **Explanation:** The -e flag (short for --edit) opens the global configuration file in the default editor you just set.
* **Expected Outcome:** Your global .gitconfig file should open in Notepad++. This confirms that the integration was successful. The file will contain the [user] and [core] sections you just configured. You can simply close Notepad++ without making any changes.

## Step 3: Creating and Tracking Your First File

This is the core of the Git workflow: creating a local repository, adding a file, and committing it to the project's history.

### 3.1. Initialize a Local Repository

First, we need a directory on our computer for the project. Then, we'll turn that directory into a Git repository.

* **Action:** In Git Bash, create a new folder for your project and navigate into it.
* **Commands:**  
  mkdir GitDemo  
  cd GitDemo
* **Explanation:**
  + mkdir GitDemo: Creates a new directory named GitDemo.
  + cd GitDemo: Changes the current location of the terminal into the GitDemo directory.
* **Action:** Now, initialize the repository.
* **Command:**  
  git init
* **Explanation:** This command creates a new, hidden .git subdirectory within your GitDemo folder. This .git folder contains all the necessary files and metadata for Git to track history, manage branches, and store your commits. Your GitDemo folder is now a Git "working directory."

### 3.2. Create and Add Content to a File

Let's create a simple text file to work with.

* **Action:** Create a file named welcome.txt with some content.
* **Command:**  
  echo "Hello, welcome to our Git project!" > welcome.txt
* **Explanation:**
  + echo: A standard command-line utility that prints text.
  + >: A redirection operator. It takes the output of the echo command and writes it into the file welcome.txt, creating the file if it doesn't exist.

### 3.3. Check the Status (The Untracked File)

The git status command is your most-used Git command. It tells you the current state of your repository.

* **Action:** Check the status of your new repository.
* **Command:**  
  git status
* **Expected Output:**  
  On branch master  
    
  No commits yet  
    
  Untracked files:  
   (use "git add <file>..." to include in what will be committed)  
   welcome.txt  
    
  nothing added to commit but untracked files present (use "git add" to track)
* **Explanation:** Git sees that welcome.txt exists in the working directory, but it is "untracked." This means the file is not part of Git's version history yet. Git is waiting for you to decide if this file should be included in the next project snapshot (commit).

### 3.4. Stage the File

Before you commit a file, you must first add it to the "staging area." The staging area is an intermediate step where you gather all the changes you want to include in your next commit.

* **Action:** Add welcome.txt to the staging area.
* **Command:**  
  git add welcome.txt
* **Explanation:** This command takes the current version of welcome.txt and places it in the staging area, marking it for inclusion in the next commit.
* **Action:** Check the status again.
* **Command:**  
  git status
* **Expected Output:**  
  On branch master  
    
  No commits yet  
    
  Changes to be committed:  
   (use "git rm --cached <file>..." to unstage)  
   new file: welcome.txt
* **Explanation:** The message has changed. Git now shows welcome.txt under "Changes to be committed." The file is now staged.

### 3.5. Commit the Staged File

A "commit" is a snapshot of your staged changes at a specific point in time. Each commit has a unique ID and a descriptive message.

* **Action:** Commit the staged file with a message.
* **Command:**  
  git commit -m "Add initial welcome file"
* **Explanation:**
  + git commit: The command to create a new commit.
  + -m "...": A flag that allows you to provide a short commit message directly on the command line. If you run git commit without the -m flag, Git will open the default editor (Notepad++) for you to write a more detailed, multi-line message.
* **Expected Output:** You will see a message confirming the commit, showing the branch, the commit hash (a unique ID), and a summary of the changes.
* **Action:** Check the status one last time.
* **Command:**  
  git status
* **Expected Output:**  
  On branch master  
  nothing to commit, working tree clean
* **Explanation:** This message confirms that your working directory is clean. All changes have been successfully saved (committed) into the local repository's history.

## Step 4: Connecting Local and Remote Repositories

Your project now exists on your local machine, but no one else can see it. The final step is to connect your local repository to the remote one you created on GitLab and "push" your commits there.

### 4.1. Link the Remote

You need to tell your local repository the URL of the remote one on GitLab.

* **Action:** Go to your GitDemo project page on GitLab. Click the "Clone" button and copy the "Clone with HTTPS" URL. It will look something like https://gitlab.com/your-username/gitdemo.git.
* **Command:** In Git Bash, run the following command, pasting the URL you just copied. We give the remote a nickname, traditionally origin.  
  git remote add origin https://gitlab.com/your-username/gitdemo.git
* **Explanation:**
  + git remote add: The command to add a new remote connection.
  + origin: The standard nickname for the primary remote repository.
  + https://...: The URL of the remote.

### 4.2. Push Your Local Commits to the Remote

"Pushing" is the act of uploading your local commits to the remote repository.

* **Action:** Push your master branch to origin.
* **Command:**  
  git push -u origin master
* **Explanation:**
  + git push: The command to upload commits.
  + origin: The destination remote (the nickname we just set).
  + master: The local branch you are pushing.
  + -u: (short for --set-upstream) This is a one-time flag that creates a link between your local master branch and the master branch on origin. In the future, you can simply run git push from this branch without specifying the remote and branch again.
* **Action:** You may be prompted for your GitLab username and password. Enter them to authorize the push.
* **Expected Outcome:** After the push completes, go back to your GitLab project page in your web browser and refresh it. You will now see your welcome.txt file and the commit message "Add initial welcome file" listed in the project.

Congratulations! You have successfully set up Git, created a local repository, tracked and committed a file, and pushed your work to a remote repository on GitLab.