Department of
Computer Science and Engineering

Title: Version Control (Using Git) Part I

Software Testing & Quality Assurance Lab CSE 434

Green University of Bangladesh

1 Objective(s)

- To understand the basic concepts of Git local repository.
- To learn how to create a local repository, add files to the Git index, commit changes, check the status, view the history of changes in the local repository.

2 Introduction

A Git repository is a directory that contains all the files and directories of a project, along with the entire history of the changes made to them. A local repository is a Git repository that is stored on your local computer. A Git local repository consists of three main parts:

- The Workspace: The workspace is the directory on your local machine where you keep your project files.

- The Index: The index, also known as the staging area, is a file that stores information about the changes you have made to the files in the workspace that you want to include in the next commit.
- The Local Repository: The local repository is the directory where Git stores the entire history of changes made to the files in the project.

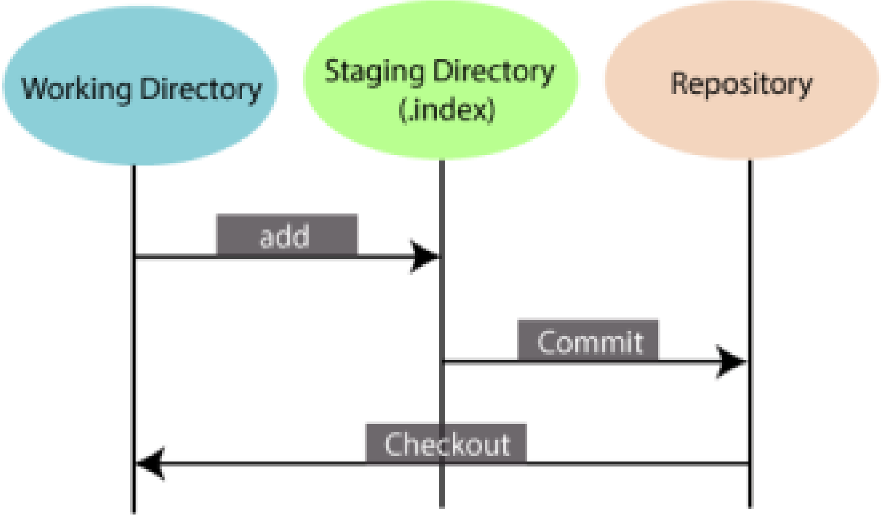


Figure 1: Main parts in local repositories

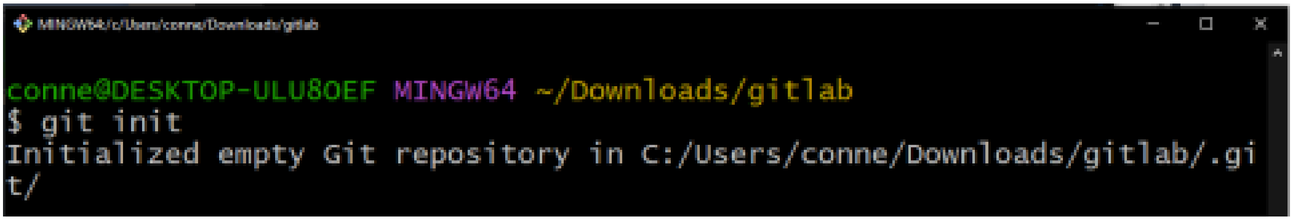
3 Basic Git Commands for Local Repositories

3.1 Creating a Local Repository

To create a local repository, follow these steps:

1. Open the terminal or Git Bash.
2. Navigate to the directory where you want to create the repository.
3. Type the command: git init

This will initialize an empty Git repository in the current directory.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab
$ git init
Initialized empty Git repository in C:/Users/conne/Downloads/gitlab/.gi
t/
```

Figure 2

3.2 Adding Files to the Index

To add files to the Git index, follow these steps:

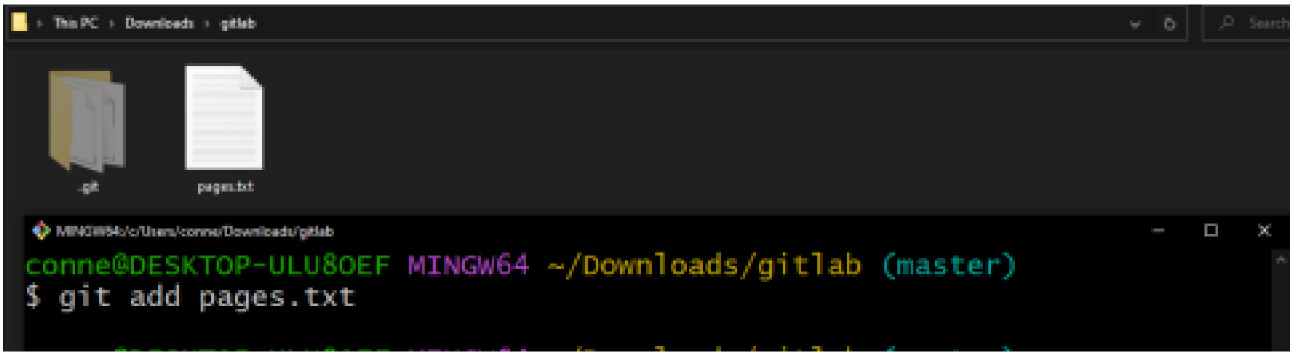
1. Create some files (Ex. a text file).

2. Make changes to the files in the workspace.

3. Type the command: git add filename

4. Replace "filename" with the name of the file you want to add to the index.

5. Repeat the command for each file you want to add to the index.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git add pages.txt
```

Figure 3

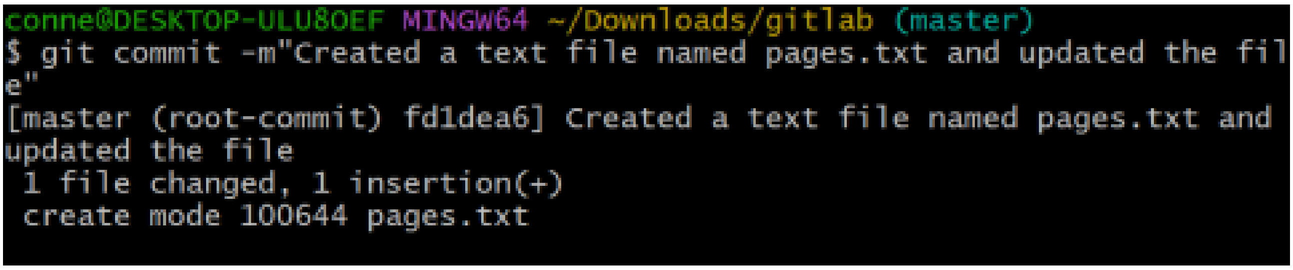
3.3 Committing Changes to the Local Repository

To commit changes to the local repository, follow these steps:

1. Type the command: git commit -m "Commit message"

2. Replace "Commit message" with a brief description of the changes you made.

3. This will create a new commit in the local repository with the changes you made.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git commit -m"Created a text file named pages.txt and updated the fil
e"
[master (root-commit) fd1dea6] Created a text file named pages.txt and
updated the file
 1 file changed, 1 insertion(+)
 create mode 100644 pages.txt
```

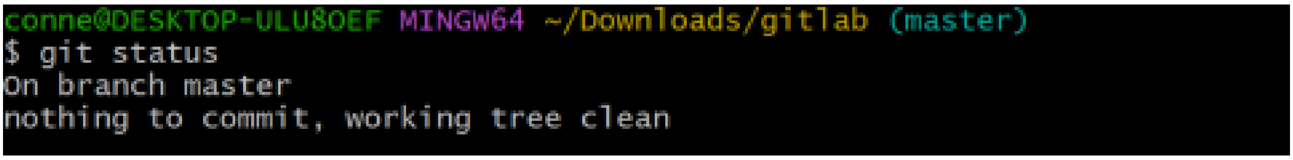
Figure 4

3.4 Checking the Status of Files

To check the status of files in the local repository, follow these steps:

1. Type the command: git status

2. This will show you the files that have been modified, added, or deleted since the last commit.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git status
On branch master
nothing to commit, working tree clean
```

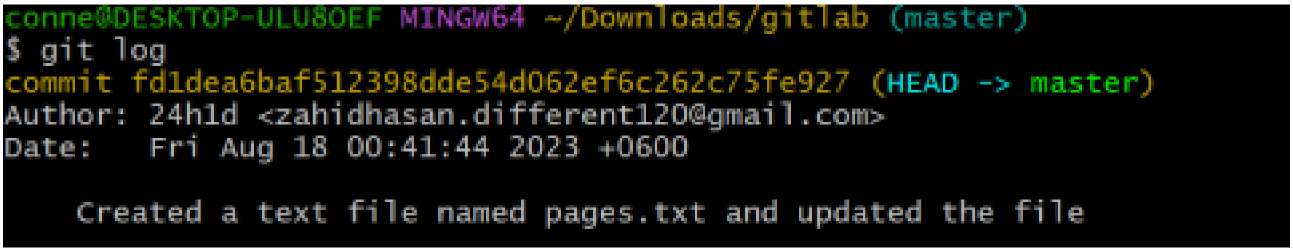
Figure 5

3.5 Viewing the History of Changes

To view the history of changes in the local repository, follow these steps:

1. Type the command: git log

2. This will show you a list of all the commits made in the local repository, along with the commit message, author, and date.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git log
commit fd1dea6baf512398dde54d062ef6c262c75fe927 (HEAD -> master)
Author: 24h1d <zahidhasan.different120@gmail.com>
Date:   Fri Aug 18 00:41:44 2023 +0600

    Created a text file named pages.txt and updated the file
```

Figure 6

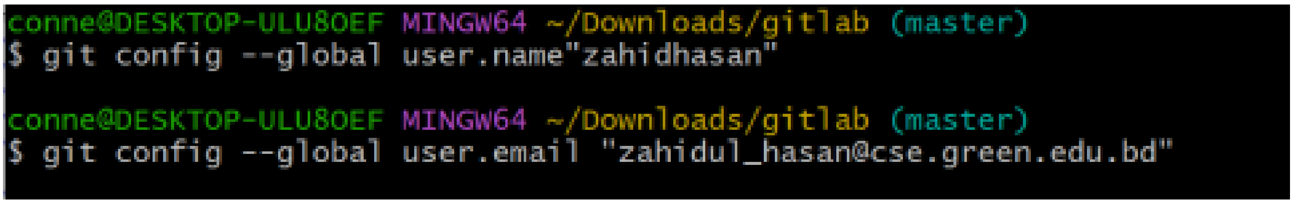
3.6 Configuring Git

Before using Git, you need to configure your username and email address. To configure Git, follow these

steps: 1. Open the terminal or Git Bash.

2. Type the command: git config --global user.name "Your Name"
   Replace "Your Name" with your name.

3. Type the command: git config --global user.email "youremail@example.com" Replace "youremail@example.com" with your email address.



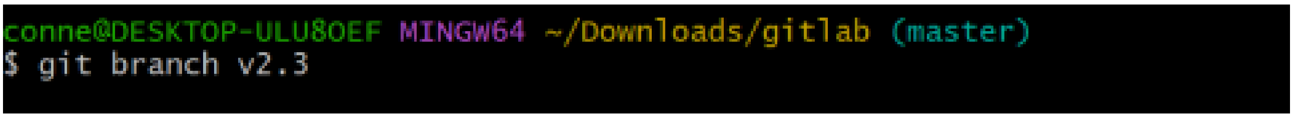
```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git config --global user.name"zahidhasan"

conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git config --global user.email "zahidul_hasan@cse.green.edu.bd"
```

Figure 7

3.7 Creating a Branch

A branch is a parallel version of the main project. To create a new branch, follow these steps:

1. Type the command: git branch branchname
   Replace "branchname" with the name you want to give to the new branch.



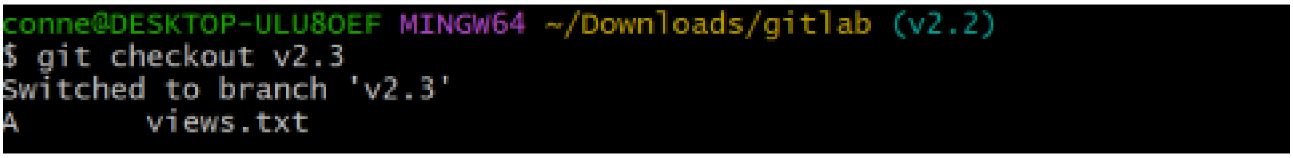
```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git branch v2.3
```

Figure 8

3.8 Switching Branches

To switch to a different branch, follow these steps:

1. Type the command: git checkout branchname
   Replace "branchname" with the name of the branch you want to switch to.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (v2.2)
$ git checkout v2.3
Switched to branch 'v2.3'
A       views.txt
```

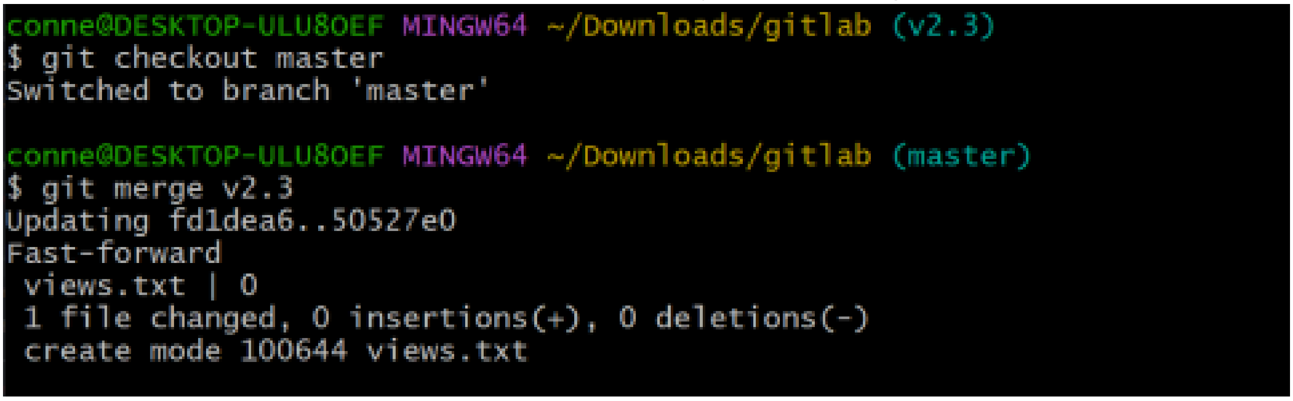
Figure 9

3.9 Merging Branches

Merging combines the changes from different branches into one. To merge two branches, follow these

steps: 1. Switch to the branch you want to merge into.

2. Type the command: git merge branchname
Replace "branchname" with the name of the branch you want to merge into the current branch.



```
conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (v2.3)
$ git checkout master
Switched to branch 'master'

conne@DESKTOP-ULU8OEF MINGW64 ~/Downloads/gitlab (master)
$ git merge v2.3
Updating fd1dea6..50527e0
Fast-forward
 views.txt | 0
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 views.txt
```

Figure 10

4 Discussion & Conclusion

In this lab, we learned the basic commands for working with a Git local repository. We learned how to create a local repository, add files to the index, commit changes to the local repository, check the status of files, view the history of changes, configure Git, create and switch between branches, and merge branches in the local repository. These commands are the building blocks for working with Git and are crucial for managing larger projects and collaborating with other developers. By mastering these commands, you will have a solid foundation for working with Git and version control.

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

In this lab task, you will be working with a Git local repository and using basic Git commands to manage your project. Follow the steps below to complete the lab task:

1. Create a new directory on your computer where you want to store your Git repository.
2. Open the terminal or Git Bash and navigate to the directory you just created.
3. Initialize a new Git repository in the directory using the command git init.
4. Create a new file in the directory and add some content to it.

5. Add the file to the Git index using the command git add filename.
6. Commit the changes to the local repository using the command git commit -m "Initial commit". 7.

Check the status of the repository using the command git status.

8. View the history of commits in the repository using the command git log.
9. Create a new branch using the command git branch branchname.
10. Switch to the new branch using the command git checkout branchname.
11. Make some changes to the file and commit them to the new branch using the commands git add filename, git commit -m "Commit message".
12. Switch back to the main branch using the command git checkout main.
13. Merge the changes from the new branch into the main branch using the command git merge

branchname. 14. View the history of commits again using the command git log to see the merge commit.

6 Lab Exercise (Submit as a report)

Create a doc file and include the following in your submission:

1. The list of commands you used for completing the lab task.
2. Screenshots of the terminal or Git Bash showing the output of the commands used in the lab task.
3. A brief description of your experience completing the lab task, including any challenges you faced and how you overcame them.

7 Policy

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