

Experiment 3: To Perform various Git operations on local and remote repositories using Git cheat sheet.

THEORY:

Introduction to Git

Git is a distributed version control system used for tracking changes in source code. It allows multiple developers to work on a project simultaneously while keeping track of changes and enabling collaboration through remote repositories like GitHub, GitLab, and Bitbucket.

Configuring Git

Before using Git for the first time, it is necessary to configure the user's identity. The following commands set up the user's name and email, which will be associated with all commits:

```
bash
```

```
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```

```
git config --global user.name "Your Name"
```

```
git config --global user.email "your.email@example.com"
```

The `--global` flag ensures that the configuration applies to all repositories on the system.

Initializing a Git Repository

A Git repository must be initialized before tracking changes. This is done using the `git init` command:

```
bash
```

```
CopyEdit
```

```
git init
```

Executing this command creates a hidden `.git` directory within the project folder, which stores all version control information.

Checking the Status of a Repository

To check the current state of the repository, including untracked and modified files, the following command is used:

```
bash
```

```
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```

```
git status
```

This command provides an overview of changes that need to be staged, committed, or pushed.

Adding Files to the Staging Area

Before committing changes, files must be added to the staging area. This can be done using the following commands:

bash

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```
git add <file_name> # Adds a specific file
```

```
git add . # Adds all modified and new files
```

The staging area acts as an intermediate step before committing changes.

Committing Changes

A commit captures the current state of the repository and saves it locally. Each commit requires a message that describes the changes made:

bash

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```
git commit -m "Descriptive commit message"
```

Commits are local and do not affect the remote repository until they are pushed.

Connecting to a Remote Repository

To link the local repository with a remote repository (e.g., GitHub), the following command is used:

bash

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```
git remote add origin <repository_URL>
```

For example:

bash

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```
git remote add origin https://github.com/username/repository.git
```

To verify that the remote repository has been added, use:

bash

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```
git remote -v
```

Pushing Changes to a Remote Repository

To upload commits to a remote repository, the git push command is used:

bash

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```
git push origin main
```

- origin refers to the remote repository.
- main refers to the branch being pushed.

For the first push, use:

bash

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```
git push -u origin main
```

The -u flag sets origin main as the default upstream branch, allowing future pushes to be done with git push alone.

Pulling Changes from a Remote Repository

To retrieve and merge updates from the remote repository, the git pull command is used:

bash

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```
git pull origin main
```

This command ensures the local repository is up-to-date with the remote repository.

Cloning an Existing Repository

To create a local copy of an existing remote repository, the git clone command is used:

bash

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```
git clone <repository_URL>
```

For example:

bash

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

This command downloads the repository and sets up a connection to the remote repository.

Branching and Merging

Git allows working with multiple branches to develop new features without affecting the main codebase.

Creating a new branch:

bash

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git branch new-branch

Switching to the new branch:

bash

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git checkout new-branch

Merging a branch into the main branch:

bash

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git merge new-branch

Deleting a branch:

bash

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git branch -d new-branch

Branches help in parallel development and version control management.

Output:

```
MINGW64/C:/Users/Lenovo/Downloads/exp/git-dvcs/git-demo-project
--[no-]default <value> with --get, use default value when missing entry

lenovo@201-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global.user.name "AtharvaVichare"
error: unknown option 'global.user.name'
usage: git config [options]

Config file location
--[no-]global use global config file
--[no-]system use system config file
--[no-]local use repository config file
--[no-]worktree use per-worktree config file
-f, --[no-]file <file> use given config file
--[no-]blob <blob-id> read config from given blob object

Action
--[no-]get get value: name [value-pattern]
--[no-]get-all get all values: key [value-pattern]
--[no-]get-regexp get values for regexp: name-regexp [value-pattern]
--[no-]get-urlmatch get value specific for the URL: section[.var] URL
--[no-]replace-all replace all matching variables: name value [value-pattern]

ern
--[no-]add add a new variable: name value
--[no-]unset remove a variable: name [value-pattern]
--[no-]unset-all remove all matches: name [value-pattern]
--[no-]rename-section rename section: old-name new-name
--[no-]remove-section remove a section: name
-l, --[no-]list list all
--[no-]fixed-value use string equality when comparing values to 'value-pattern'

Item
-e, --[no-]edit open an editor
--[no-]get-color find the color configured: slot [default]
--[no-]get-colorbool find the color settings: slot [stdout-is-ty]

Type
-t, --[no-]type <type> value is given this type
--bool value is "true" or "false"
--int value is decimal number
--bool-or-int value is --bool or --int
--bool-or-str value is --bool or string
--path value is a path (file or directory name)
--expiry-date value is an expiry date

Other
-z, --[no-]null terminate values with NUL byte
--[no-]name-only show variable names only
--[no-]includes respect include directives on lookup
--[no-]show-origin show origin of config (file, standard input, blob, command line)
--[no-]show-scope show scope of config (worktree, local, global, system, command)
--[no-]default <value> with --get, use default value when missing entry

lenovo@201-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ cd git-dvcs

lenovo@201-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global
usage: git config [options]

Config file location
--[no-]global use global config file
--[no-]system use system config file
--[no-]local use repository config file
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lenovo@201-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global.user.name "AtharvaVichare"
```

```
MINGW64 ~/Downloads/exp/git-dvcs/git-demo-project
$ mkdir git-dvcs
$ cd git-dvcs
$ git config --global
usage: git config [options]

Config file location
  --[no-]global      use global config file
  --[no-]system      use system config file
  --[no-]local        use repository config file
  --[no-]worktree     use per-worktree config file
  -f, --[no-]file <file>
                     use given config file
  --[no-]blob <blob-id> read config from given blob object

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  --[no-]default <value>
                     with --get, use default value when missing entry
```

```
MINGW64 ~/Downloads/exp/git-dvcs/git-demo-project
$ cd git-demo-project
$ git push origin master
fatal: 'origin' does not appear to be a git repository
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.
$ git push origin main
error: src refspec main does not match any
error: Failed to push some refs to 'origin'
$ git status
On branch master
nothing to commit, working tree clean
$ git push origin master
fatal: 'origin' does not appear to be a git repository
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.
$ git remote add origin https://github.com/AtharvaVichare/SEPM-Lab.git
git branch -M main
git push -u origin main

remote: Permission to AtharvaVichare/SEPM-Lab.git denied to yatish20.
fatal: unable to access 'https://github.com/AtharvaVichare/SEPM-Lab.git/': The requested URL returned error: 403
$ git remote add origin https://github.com/AtharvaVichare/SEPM-Lab.git
error: remote origin already exists.
$ git push -u origin master
error: src refspec master does not match any
error: Failed to push some refs to 'https://github.com/AtharvaVichare/SEPM-Lab.git'
$ git push -u origin main
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Writing objects: 100% (4/4), 267 bytes | 267.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/AtharvaVichare/SEPM-Lab.git
 * [new branch] main -> main
branch 'main' set up to track 'origin/main'.
$
```

```
MINGW64~/Users/Lenovo/Downloads/exp/git-dvcs/git-demo-project
lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ cd git-dvcs/git-demo-project
hash: cd: git-dvcs/git-demo-project: No such file or directory

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git init
Initialized empty Git repository in C:/Users/Lenovo/Downloads/exp/git-dvcs/.git/

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (master)
$ git add .
$ git status
On branch master

No commits yet

nothing to commit (create/copy files and use "git add" to track)

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (master)
$ git commit -m "First Commit"
On branch master

Initial commit

nothing to commit (create/copy files and use "git add" to track)

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (master)
$ git add .
$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   git-demo-project/1.txt.txt

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (master)
$ git commit -m "First Commit"
[master (root-commit) fc3b092] First Commit
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 git-demo-project/1.txt.txt

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (master)
$ git push origin master
fatal: 'origin' does not appear to be a git repository
fatal: Could not read from remote repository.

Please make sure you have the correct access rights
and the repository exists.

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (master)
$ cd git-demo-project

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs/git-demo-project

MINGW64~/Users/Lenovo/Downloads/exp/git-dvcs/git-demo-project
-], --[no-]list      list all
--[no-]fixed-value  use string equality when comparing values to 'value-pa
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command)
--[no-]default <value> with --get, use default value when missing entry

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global user.name "AtharvaVichare"

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global --list
user.name=AtharvaVichare
user.email=tammy123@gmail.com
color.ui=true
user.name=AtharvaVichare

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global user.name "AtharvaVichare"

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global user.email "atharvavichare37@gmail.com"

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ git config --global --list
user.name=AtharvaVichare
user.email=atharvavichare37@gmail.com
color.ui=true
user.name=AtharvaVichare

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ mkdir git-demo-project

lenovo@2023-17 MINGW64 ~/Downloads/exp/git-dvcs (new-branch)
$ cd git-demo-prjct
hash: cd: git-demo-prjct: No such file or directory
```

Conclusion: Successfully implemented various Git operations on local and remote repositories using Git cheat sheet.