**Experiment: Demonstrate Version Control Operations – Commit, Branch, Merge, Clone (Using Git & GitHub)**

**Aim:**

To understand and demonstrate version control operations using Git and GitHub, including:

* commit
* branch
* merge
* clone

with suitable hands-on examples using a basic HTML project.

**Software Requirements:**

* Git (Installed from <https://git-scm.com>)
* GitHub Account (<https://github.com>)
* Internet connection
* Code Editor (VS Code, Notepad++)
* Terminal / Git Bash

**Objective:**

1. Understand distributed version control system
2. Learn to use Git for local version control
3. Learn to use GitHub for remote collaboration
4. Demonstrate commit, branch, merge, and clone operations with examples

|  |  |
| --- | --- |
| Operation | Git Command Example |
| Init | git init |
| Add File | git add filename |
| Commit | git commit -m "message" |
| Branch | git checkout -b branchname |
| Merge | git checkout main + git merge branchname |
| Clone | git clone <repo-url> |
| Push | git push origin branchname |

**Understanding Git Commands Used:**

|  |  |
| --- | --- |
| Operation | Git Command Example |
| Initialize Git | git init |
| Stage Changes | git add filename |
| Commit Changes | git commit -m "commit message" |
| Create Branch | git checkout -b new-branch-name |
| Merge Branch | git merge branch-name |
| Push to GitHub | git push origin branch-name |
| Clone Repo | git clone https://github.com/user/repo.git |

**Procedure with Examples:**

We'll use a basic **HTML portfolio website** with a single file: index.html.

**1. Initialize a Git Repository Locally (git init)**

**➤ Steps:**

1. Open Terminal or Git Bash
2. Create a project folder

mkdir portfolio-site

cd portfolio-site

1. Initialize Git:

git init

This creates a hidden .git folder inside the directory.

**2. Create a Sample HTML File**

echo "<!DOCTYPE html><html><head><title>My Portfolio</title></head><body><h1>Welcome!</h1></body></html>" > index.html

**3. Commit Changes (git add, git commit)**

**➤ Steps:**

git add index.html

git commit -m "Initial commit: Added basic portfolio page"

This saves the changes to the local repository.

**4. Create a New Branch (git branch)**

**➤ Steps:**

git branch about

git checkout about

Or shortcut:

git checkout -b about

You are now working on a separate branch named about.

**5. Make Changes on Branch and Commit**

Open index.html and add the following before </body>:

<p>This is the about section.</p>

Then:

git add index.html

git commit -m "Added about section"

**6. Merge Branch with Main (git merge)**

Switch to main branch:

git checkout ( go to main)

Then merge:

git merge about

Changes from about branch are now merged into main.

**7. Push to GitHub (Remote Version Control)**

**➤ Steps:**

1. Create a new repository on GitHub (e.g., portfolio-site)
2. Connect local repo to GitHub:

git remote add origin https://github.com/<your-username>/portfolio-site.git

git push -u origin main

**8. Clone Repository (git clone)**

You can now clone the repository on another system or folder:

git clone https://github.com/<your-username>/portfolio-site.git

This copies the entire project (including history and branches) to a new location.

**Expected Output**

* A repository initialized and committed locally.
* New branches created and merged.
* Project pushed to GitHub successfully.
* Repository cloned from GitHub.

**Result**

Successfully demonstrated version control operations: commit, branch, merge, and clone using Git and GitHub.

**Tips**

* Use git log to see commit history.
* Use git status to see untracked/modified files.
* Use git branch -a to list all branches.