

1. Introduction to Git

Git is a version control system used for tracking changes in code during software development. It allows multiple developers to collaborate efficiently.

2. Installing Git

Windows:

Download Git

Install it with default settings.

Linux (Ubuntu/Debian):

```
sudo apt update
```

```
sudo apt install git
```

MacOS:

```
brew install git
```

Check installation:

```
git --version
```

3. Configuring Git

Set up your username and email (required for commits):

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

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

Verify configuration:

```
git config --list
```

4. Generating an SSH Key

SSH keys allow secure authentication with remote repositories.

Step 1: Generate the SSH Key

```
ssh-keygen -t rsa -b 4096 -C "your-email@example.com"
```

Press **Enter** to save in the default location (~/.ssh/id_rsa).

Step 2: Start the SSH Agent

```
eval "$(ssh-agent -s)"
```

```
ssh-add ~/.ssh/id_rsa
```

Step 3: Copy the SSH Key

```
cat ~/.ssh/id_rsa.pub
```

Copy the key and add it to your Git hosting provider (GitHub, GitLab, Bitbucket) under **SSH Keys** in settings.

Step 4: Test Connection

```
ssh -T git@github.com
```

If successful, it will return a welcome message.

5. Initializing a Git Repository

Create a new repository in a directory:

```
git init
```

This initializes an empty Git repository.

6. Adding a Remote Repository

Connect your local repository to a remote (GitHub, GitLab, etc.):

```
git remote add origin <REMOTE_URL>
```

Example:

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

Check if remote is added:

```
git remote -v
```

7. Adding and Committing Files

Stage Files for Commit:

```
git add . # Adds all files
```

Or add specific files:

```
git add filename.txt
```

Commit the Files:

```
git commit -m "Initial commit"
```

8. Pushing Changes to Remote Repository

Push committed changes to the remote repository:

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

For master branch:

```
git push -u origin master
```

9. Changing Branches

List All Branches:

```
git branch
```

Create a New Branch:

```
git branch new-branch
```

Switch to the New Branch:

```
git checkout new-branch
```

Create and Switch to a New Branch in One Command:

```
git checkout -b new-branch
```

Push the New Branch to Remote:

```
git push -u origin new-branch
```

10. General Git Commands

| | |
|------------|--|
| git status | Check the current status of your repository |
| git log | View commit history |
| git diff | Show differences between commits and working directory |

| | |
|---|--|
| <code>git clone <repo-url></code> | Clone a repository from a remote source |
| <code>git pull origin main</code> | Pull the latest changes from the main branch |
| <code>git reset --hard <commit-hash></code> | Reset the repository to a previous commit |
| <code>git stash</code> | Save uncommitted changes for later use |
| <code>git stash pop</code> | Restore stashed changes |
| <code>git merge <branch></code> | Merge another branch into the current branch |