

Experiment: 02

Aim: To understand version control system, install Git and GitHub account

What is Version Control?

Version control is a system that allows developers to track and manage changes to software code over time. It enables collaboration, ensures code integrity, and allows multiple versions of the code to be stored and retrieved as needed. The main goal of version control is to keep track of modifications to a project, making it easier to collaborate, manage different versions of files, and track changes over time.

There are two types of version control systems:

1. **Local Version Control:** This is the simplest form, where a developer keeps track of changes on their own computer.
2. **Distributed Version Control:** This is more advanced and is used by systems like Git, where each developer has their own local copy of the entire project repository (including its history), and changes are synchronized with others.

What is Git?

Git is a distributed version control system created by Linus Torvalds (the creator of Linux). Git helps developers manage the source code history by tracking changes and enabling multiple developers to work on a project without stepping on each other's toes. With Git, you can:

- **Track changes:** See what was modified and by whom.
- **Branching and merging:** Work on different parts of a project in parallel, then merge those parts back together.
- **Collaboration:** Work with others by pushing and pulling changes from remote repositories.

How Git Works:

1. **Repository (repo):** A directory or storage space where Git keeps all the files, history, and versions of a project.

2. **Commit:** A snapshot of your project at a particular point in time. It records changes made to the project files.
3. **Branch:** A parallel version of the repository. You can create a new branch to work on a feature without affecting the main project.
4. **Merge:** The process of combining changes from different branches back into the main branch.

What is GitHub?

GitHub is a web-based platform that hosts Git repositories. It provides a user interface for managing Git repositories, collaborating with others, and sharing your code. GitHub makes it easier for developers to work together on a project, track bugs, and manage project releases.

Key features of GitHub:

- **Remote repositories:** You can upload your local Git repositories to GitHub to back them up or collaborate.
- **Pull requests:** A way of proposing changes to a repository. A developer can submit a pull request to request that their changes be merged into another branch or the main codebase.
- **Issues and projects:** Track bugs, feature requests, and manage the workflow of development using tools integrated into GitHub.
- **Collaboration:** GitHub makes it easy for multiple people to work on a project by allowing them to push, pull, and merge changes from others.

Installing Git and Setting Up GitHub Account

Step 1: Install Git

1. Download Git from Git's official website.
2. Install Git by following the installation prompts specific to your operating system (Windows, Mac, or Linux).
 - On Windows, during installation, it is recommended to choose the default options.

- On Mac/Linux, you can install Git using package managers like Homebrew (Mac) or apt (Linux).

Once Git is installed, you can verify it by opening a terminal or command prompt and running:

```
git --version
```

3. This will display the version of Git installed.

[Git Official Site](#)

Step 2: Set Up Git

Before you start using Git, you should configure your identity:

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

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

This ensures that your commits are properly attributed to you.

Step 3: Create a GitHub Account

1. Go to [GitHub](#) and sign up for an account.
 2. After signing up, you'll be able to create repositories and start collaborating with others.
 3. You can create a new repository by clicking the **New** button on your dashboard or through the **Repositories** tab.
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Step 4: Link Git with GitHub (SSH Keys)

To allow Git to communicate with GitHub, you need to set up SSH keys for authentication (instead of using your password every time).

Generate an SSH key:

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

1. This will generate a key pair (public and private keys).
2. **Add the SSH key to your GitHub account:**

Copy the public key using:

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

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- Go to **GitHub > Settings > SSH and GPG Keys > New SSH Key**, then paste the key into the field provided.

Test the connection:

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

3. If successful, GitHub will confirm the connection.

Step 5: Clone a GitHub Repository

To get a project from GitHub onto your local machine, you can clone the repository. In your terminal, run:

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

or, if using SSH:

```
git clone git@github.com:username/repository-name.git
```

Step 6: Basic Git Commands

Check the status of your repository:

```
git status
```

-

Add changes to the staging area:

```
git add .
```

-

Commit changes to your local repository:

```
git commit -m "Your commit message"
```

-

Push changes to GitHub:

```
git push origin main
```

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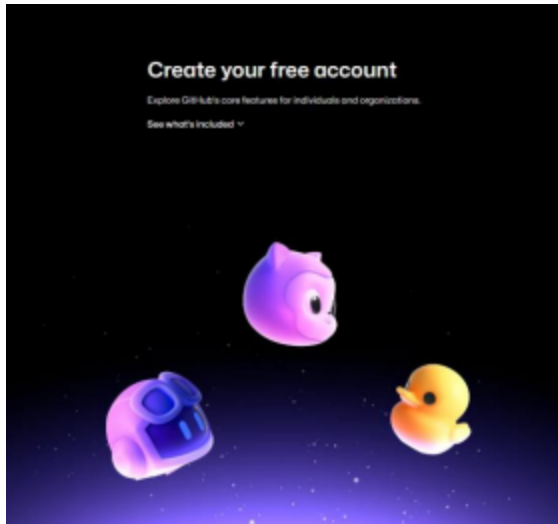
Pull changes from GitHub to your local repository:

```
git pull origin main
```

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GitHub Account Setup Steps:

1. Go to [GitHub Sign-Up](#)



Already have an account? [Sign in](#)

Sign up to GitHub

Email

Password

Password should be at least 16 characters OR at least 8 characters including a number and a lowercase letter.

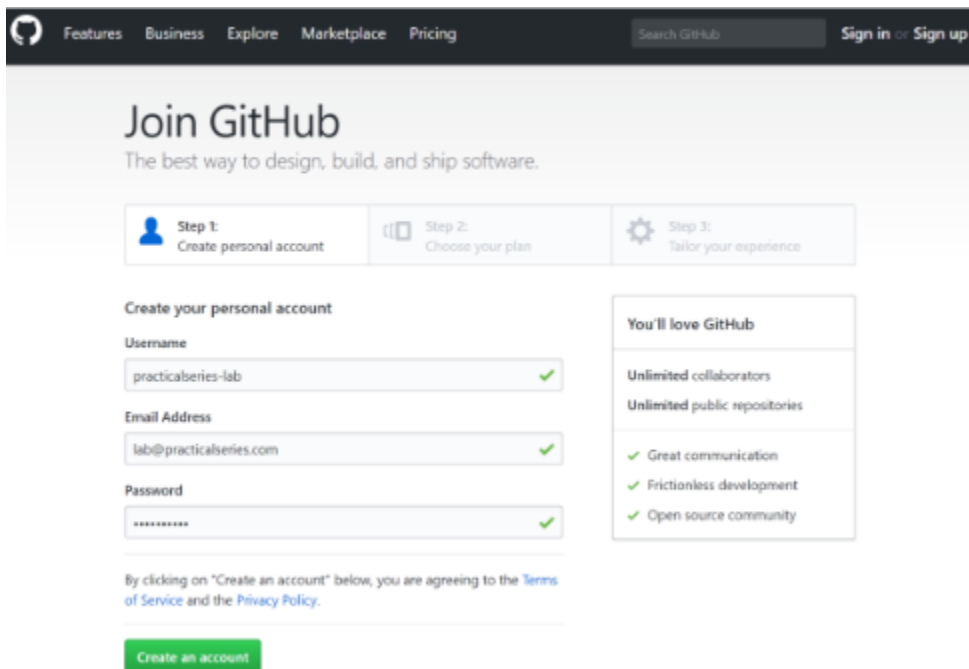
Username

Username may only contain alphanumeric characters or single hyphens, and cannot begin or end with a hyphen.

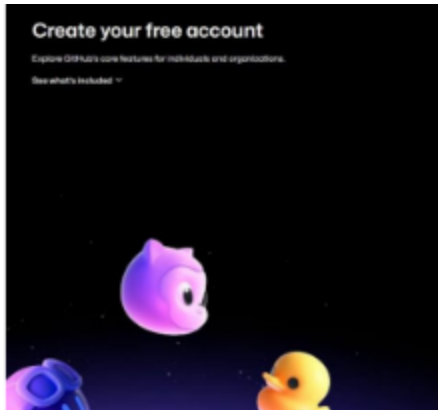
[Continue](#)

By creating an account, you agree to the [Terms of Service](#). For more information about GitHub's privacy practices, see the [GitHub Privacy Statement](#). We'll occasionally send you account-related emails.

2. Enter your personal information

A screenshot of the GitHub 'Join GitHub' registration page. The page has a dark header with navigation links (Features, Business, Explore, Marketplace, Pricing), a search bar, and 'Sign in' or 'Sign up' links. The main heading is 'Join GitHub' with the tagline 'The best way to design, build, and ship software.' Below this is a three-step progress bar: 'Step 1: Create personal account' (active), 'Step 2: Choose your plan', and 'Step 3: Tailor your experience'. The 'Create your personal account' section contains three input fields: 'Username' (practicalseries-lab), 'Email Address' (lab@practicalseries.com), and 'Password' (masked with dots), each with a green checkmark indicating it's valid. To the right, a box titled 'You'll love GitHub' lists benefits: 'Unlimited collaborators', 'Unlimited public repositories', 'Great communication', 'Frictionless development', and 'Open source community'. At the bottom, a green 'Create an account' button is visible, preceded by a disclaimer about agreeing to the Terms of Service and Privacy Policy.

3. Verify your email by entering the verification code



4. Select your preferences and choose a **Free** plan

Welcome to GitHub
You've taken your first step into a larger world, @JosephDufrases.

✓ Completed
Set up a personal account

Step 2:
Choose your plan

⚙ Step 3:
Tailor your experience

Choose your personal plan

☒ Unlimited public repositories for free.

☐ Unlimited private repositories for \$7/month.

Don't worry, you can cancel or upgrade at any time.

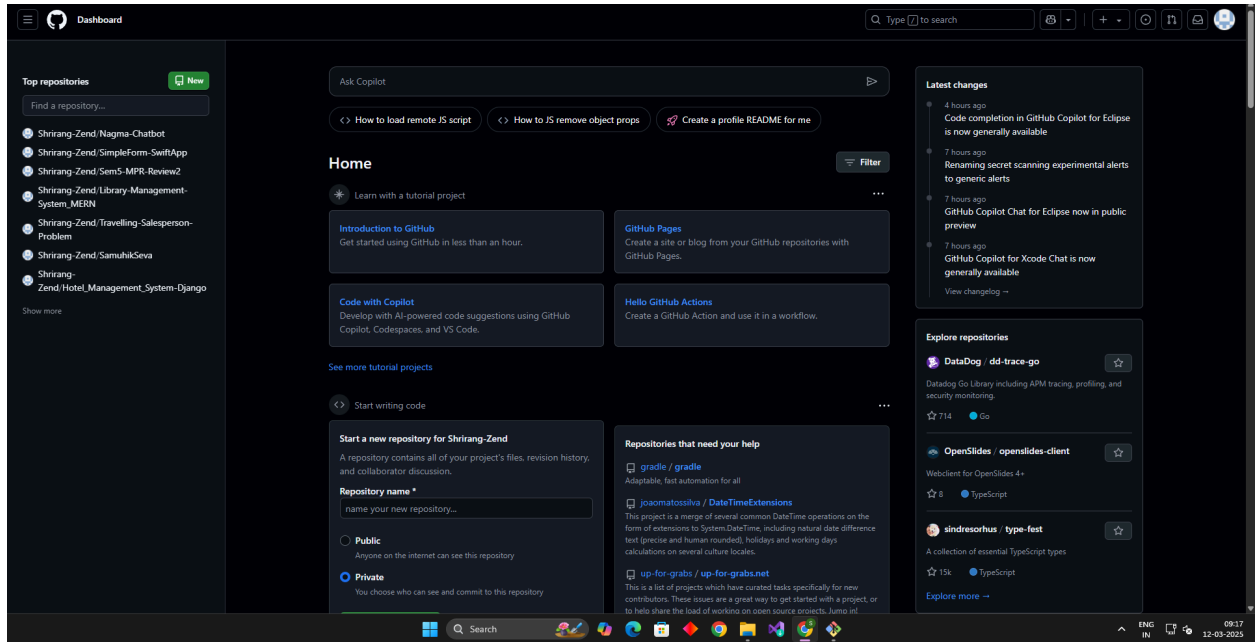
☐ **Help me set up an organization next**
Organizations are separate from personal accounts and are best suited for businesses who need to manage permissions for many employees.
[Learn more about organizations](#)

☐ **Send me updates on Github news, offers, and events**
Unsubscribe anytime in your email preferences. [Learn more](#)

Continue

Both plans include:

- ✓ Collaborative code review
- ✓ Issue tracking
- ✓ Open source community
- ✓ Unlimited public repositories
- ✓ Join any organization



Conclusion:

In summary, Git is a powerful version control system that helps you track changes, collaborate with others, and maintain the integrity of your codebase. GitHub is an online platform that makes it easy to host and share Git repositories, enabling collaboration and project management. Setting up Git and GitHub allows you to contribute to open-source projects, manage your own code, and work effectively with others in a development environment.
