Getting Started with Git and GitHub pt. 1

Coffee, Cookie and Coding (C3) Workshop supported by the Public Health Data Science and Data Equity team

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September 29th, 2025

xkcd Comic 1597 - Git Downloaded April 26th, 2025.

Yale SCHOOL OF PUBLIC HEALTH
Data Science and Data Equity

Shelby Golden, M.S.

- Worked 7 years as a Molecular Biologist and Biochemist.
- Received a Masters in Applied Computational Mathematics from Johns Hopkins University in 2024.

Justin DeMayo

- System and Application Specialist for the Harvey Cushing/John Hay Whitney Medical Library.
- Offers introductory command line, git, and python courses.

Today's Learning Objectives

01 Understand the purpose and value of Git and GitHub in managing coding projects. (~ 5 minutes)

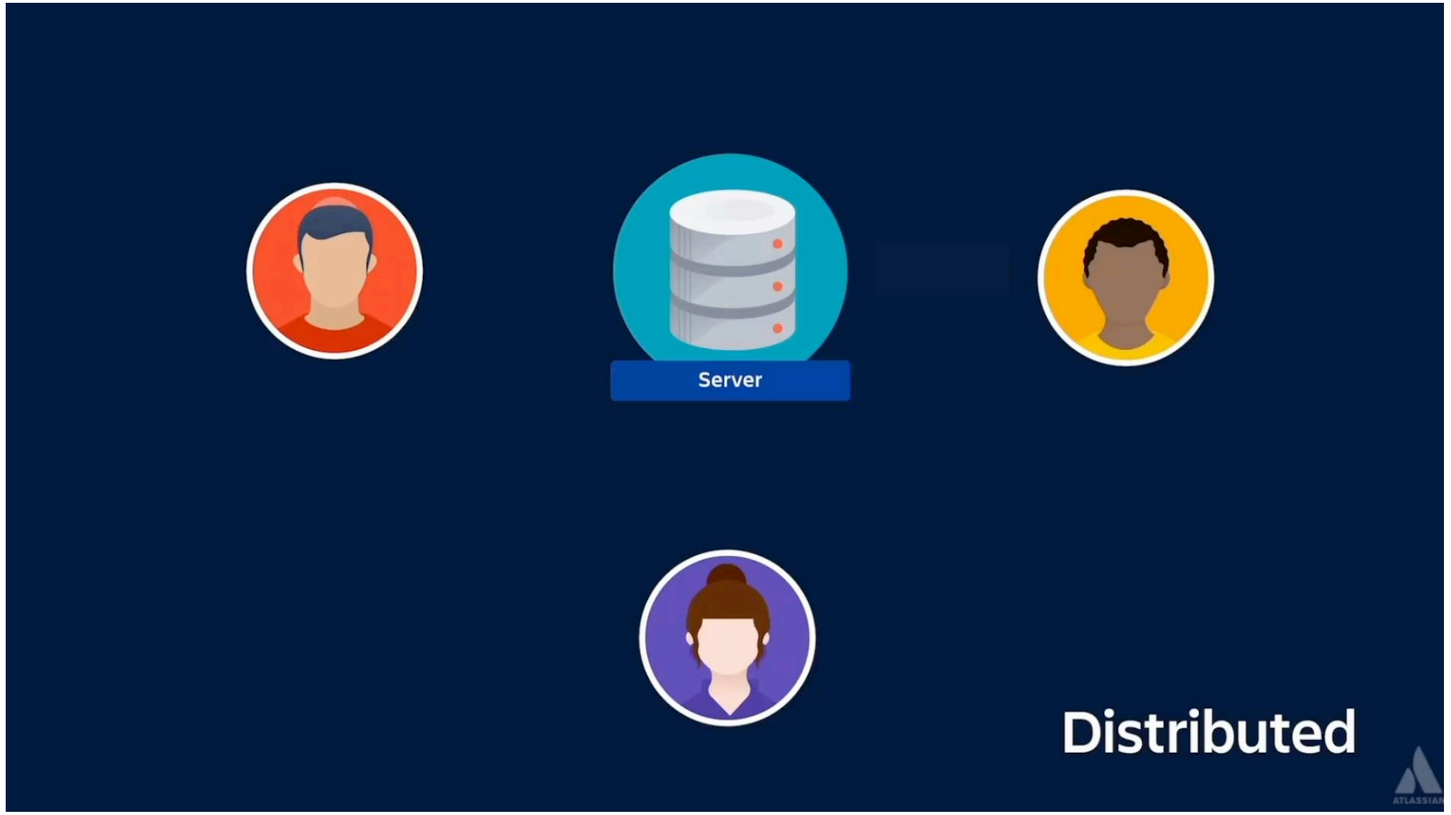
02 Learn how Git manages files for version control locally and distributes them through GitHub. (~ 15 minutes)

03 Set up and configure your local Git and GitHub accounts using either HTTPS or SSH Keys. (~ 40 minutes)

Our Choice Resources

- Yale's Center for Research Computing workshop *Version Control by Git* by Kaylea Nelson, Ph.D.
- Yale's Harvey Cushing/John Hay Whitney Medical Library workshop *Git & GitHub: An Introduction To Version Control* by Justin DeMayo
- *Getting Git Right* by Atlassian
- Git and GitHub Tutorial by W3Schools
- *Introduction to GitHub* by GitHub
- *Happy Git and GitHub for useR* by Professor Jenny Bryan (and Yale alumn!) and Jim Hester

What is Git and GitHub?



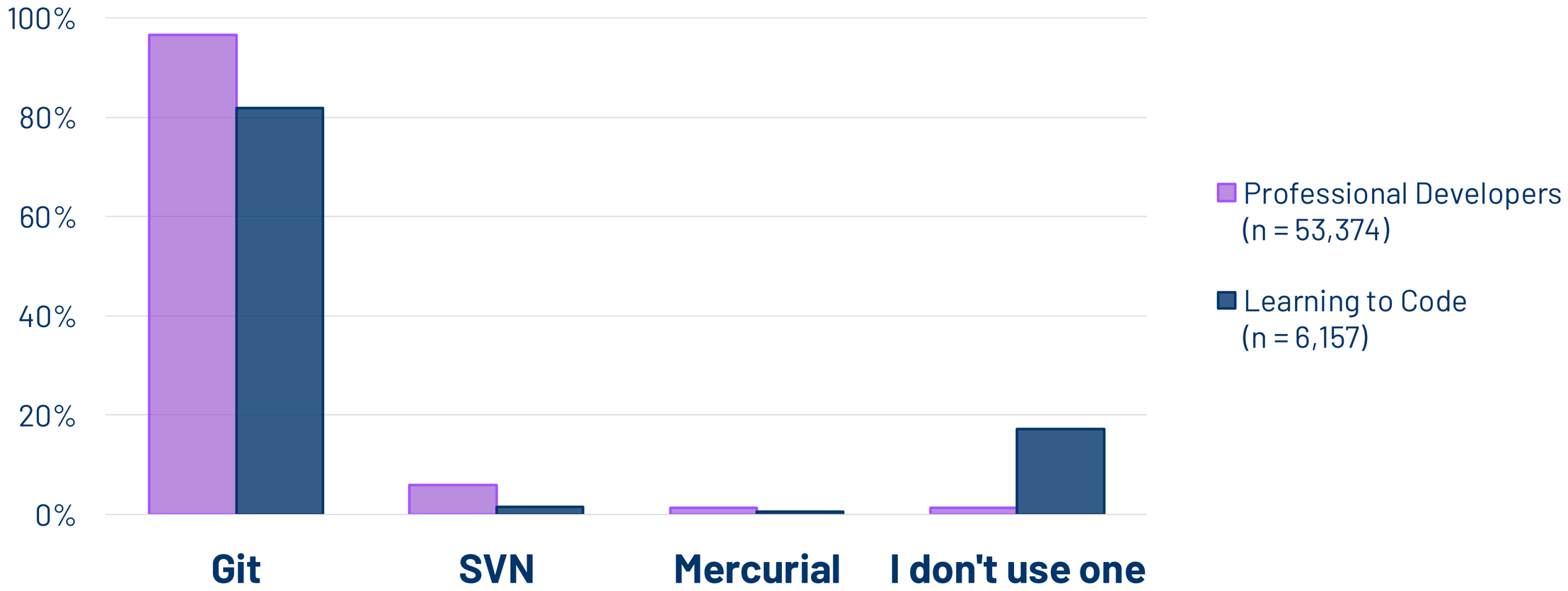
What is Version Control by Atlassian. Updated February 23rd, 2020.
Git logo. Downloaded October 10th, 2024.
GitHub logo. Downloaded October 10th, 2024.

System for project management by distributive version control (DVCS).

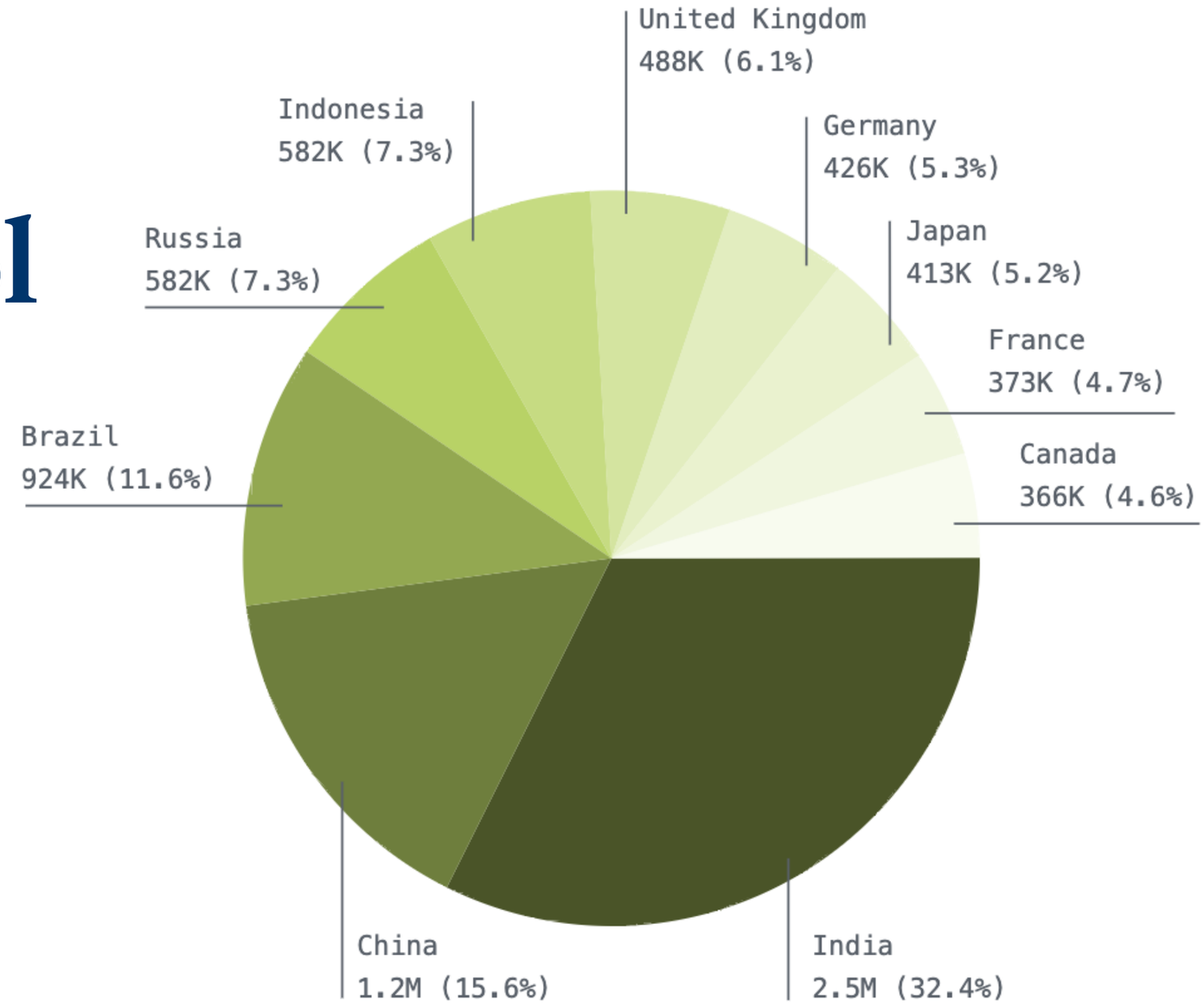
Developer platform for housing and managing projects and acts as the DVCS server.

Git is the most widely used VCS but is underutilized by those learning to code.

2022 Developer Survey by StackOverflow. Published 2022.



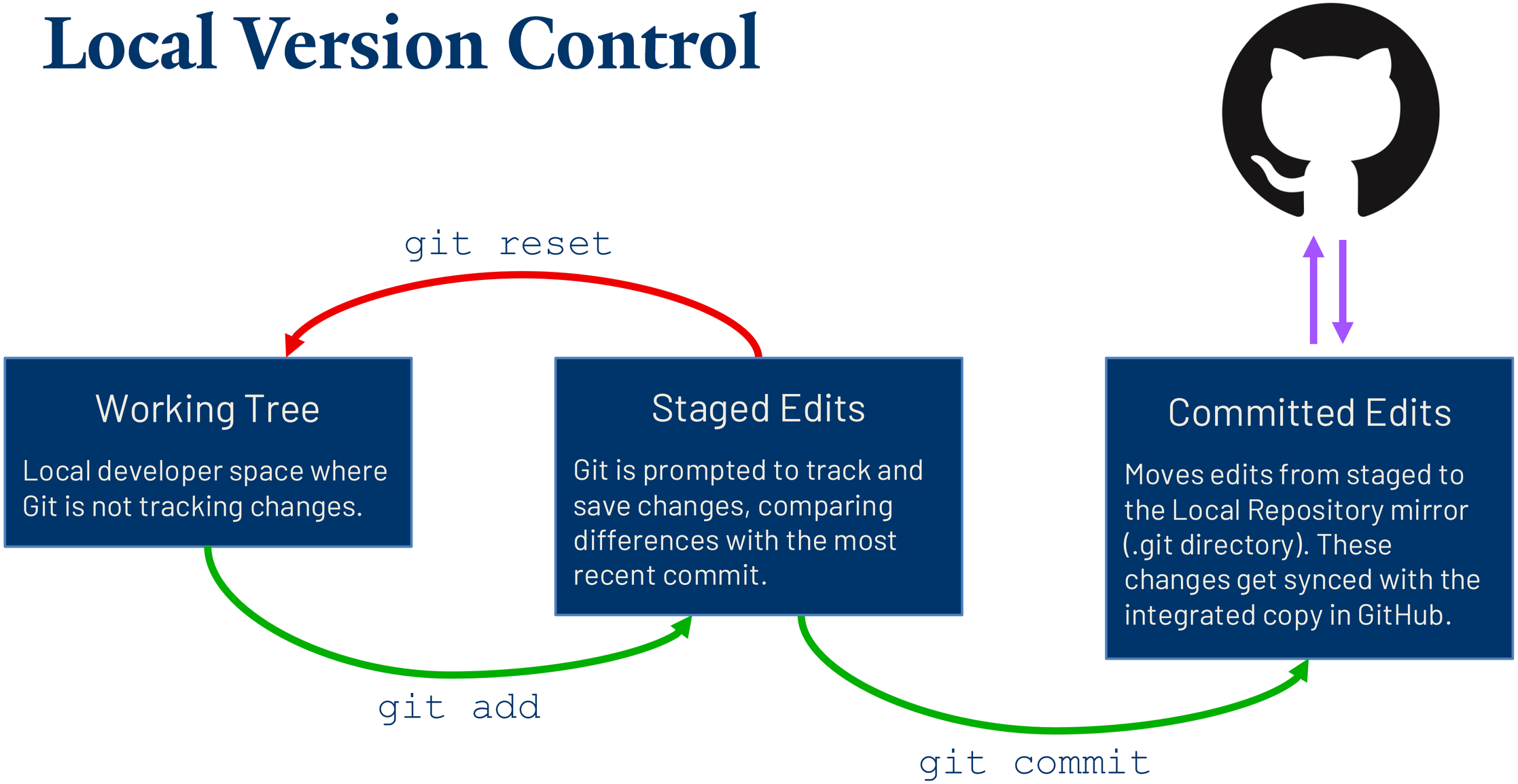
GitHub is an invaluable tool for coders worldwide.



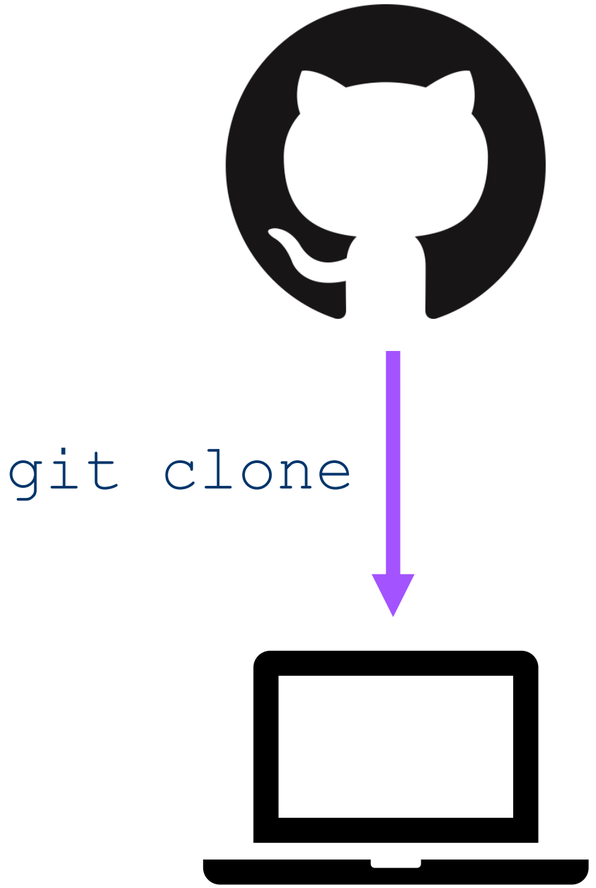
A global community of developers. by GitHub, Octoverse 2022 report.

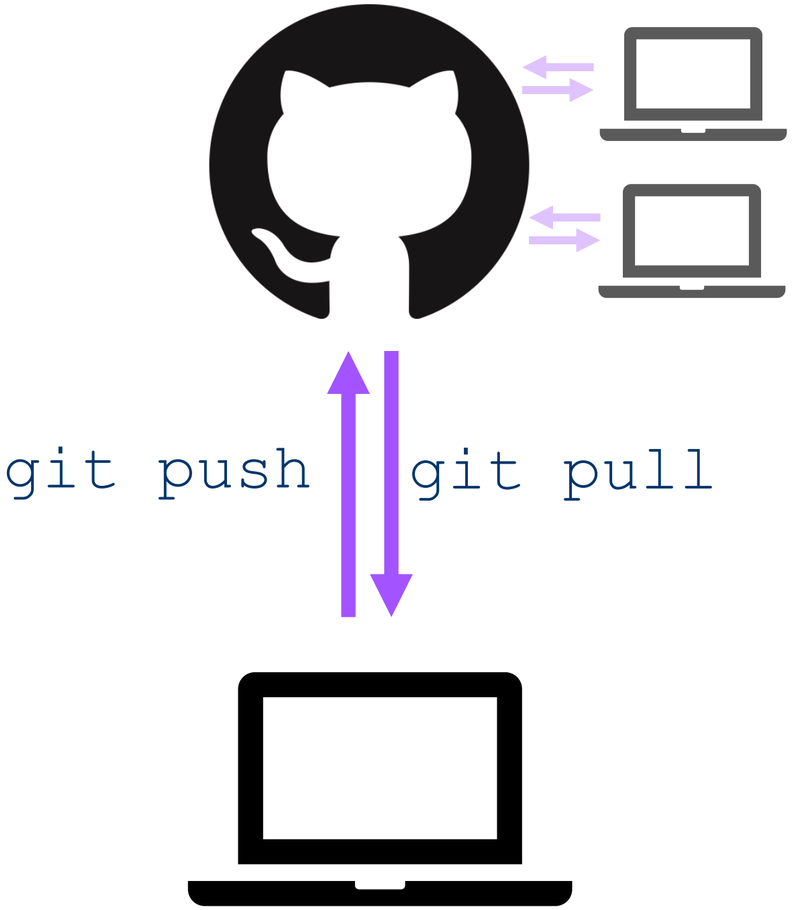
How do Git and GitHub relate to one another?

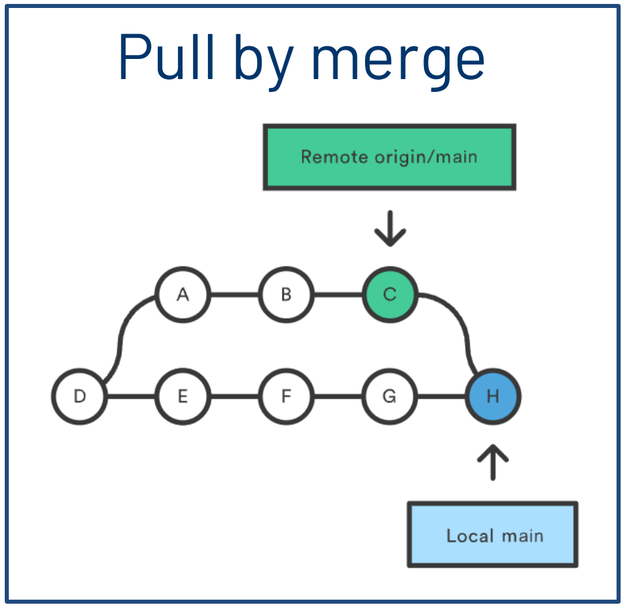
Local Version Control

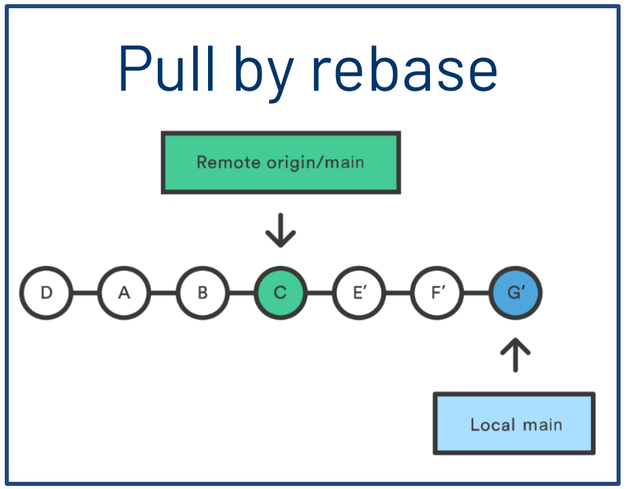


Remote Storage and Distribution









git pull from Atlassian's Git tutorials, Downloaded April 24th, 2025.

Secure Shell (SSH) Keys

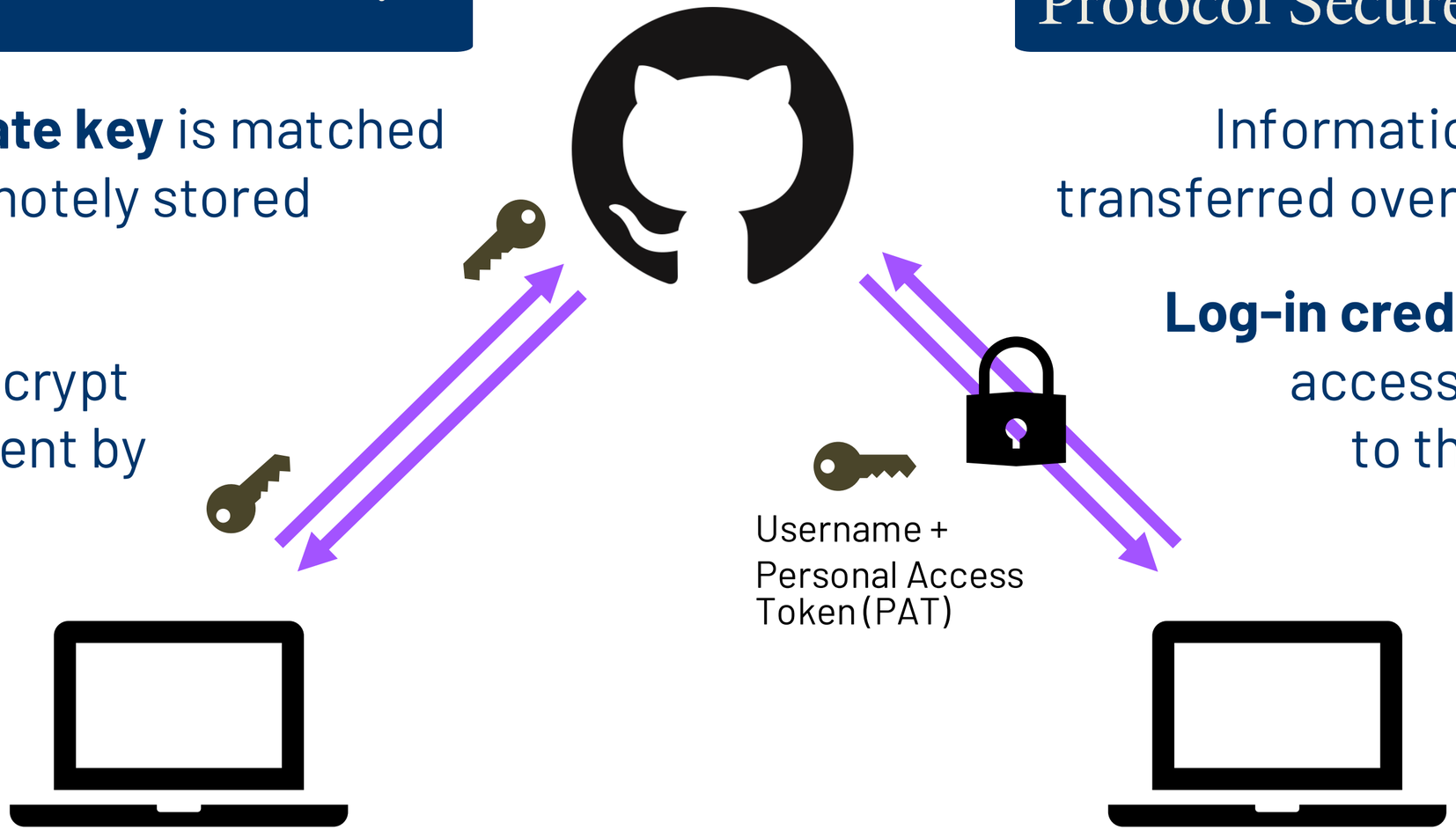
A local **private key** is matched with the remotely stored **public key**.

Keys can decrypt messages sent by their pair.

Hypertext Transfer Protocol Secure (HTTPS)

Information is securely transferred over the internet.

Log-in credentials verify access permissions to the repository.

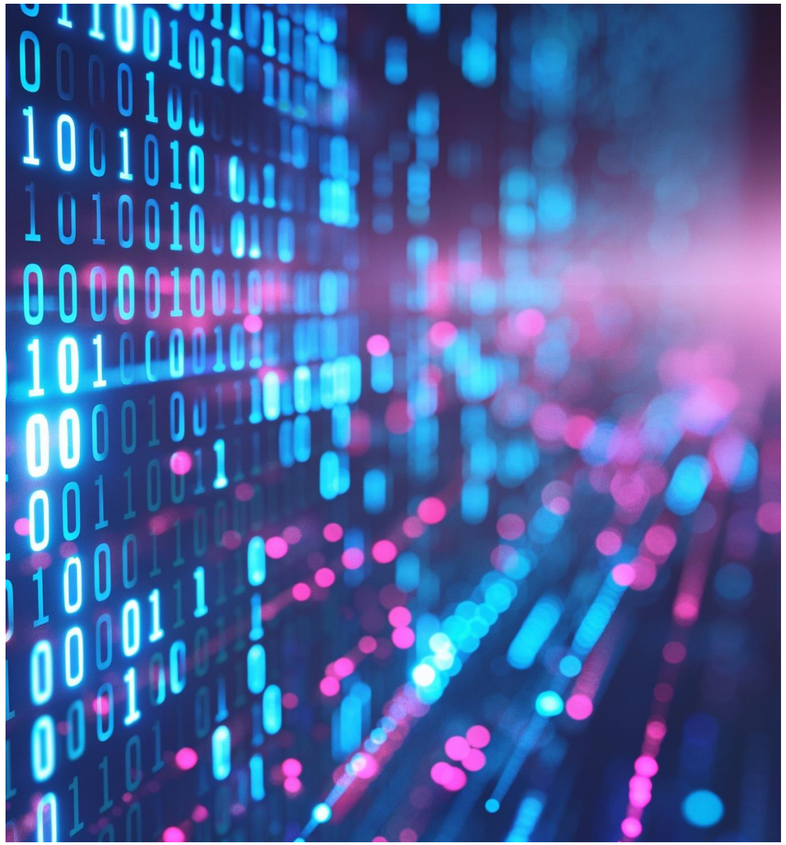


Additional Helpful Articles

- Cloning with SSH URL's and Troubleshooting SSH by GitHub
- Cloning with HTTPS URL's and Managing your PATs by GitHub
- Commit signiture verification (sign commits and tags) by GitHub
- *Managing deploy keys* by GitHub
- *Switching remote URLs from SSH to HTTPS* and *SSH to HTTPS* by GitHub
- *Using SSH agent forwarding* by GitHub
- *Caching your GitHub credentials in Git* for Windows by GitHub and *Install the git-credential-osxkeychain helper* for Macs by Atlassian

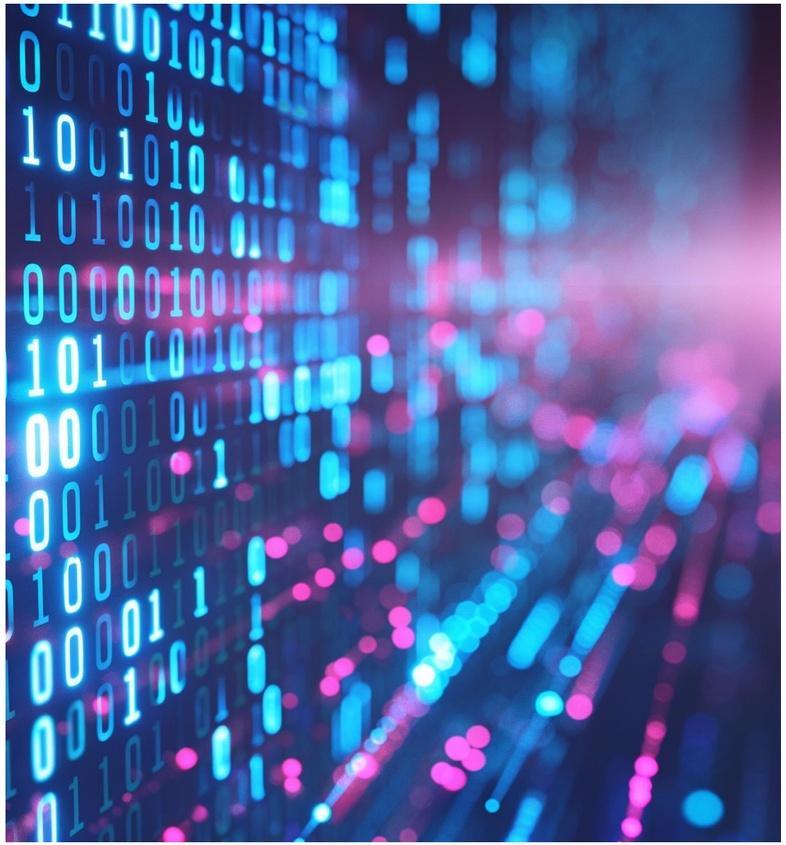
Credential Configuration: Let's Get Started!

Essential Setup



- Install Git
- GitHub Account
- HTTPS Personal Access Token (PAT)
- SSH Key Pairs

Data Transfers



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Thank you!

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Appendix

Glossary

Command-Line Interface (CLI)	A texted-base application that directly interacts with the computer's operating system, manages files, and can run programs. It typically lacks a graphical user interface (GUI).
Distributive Version Control System	The project codebase is copied as a mirror to each contributor's local computer. Local changes get synched via patches sent peer-to-peer through the server.
`git add`	Prompt Git to track changes made to specified files and transition them from the **Working Tree** to the **Staged Edits** domain. Git compares them to the .git directory.

Glossary

`git branch`	Create or list different “versions” or “paths” of a project that you can work on separately.
`git checkout`	Command to switch between the different branches.
`git clone`	Copies an existing repository stored in a remote server to your own device, including all files, history, and branches.
`git commit`	Promote the staged version of specified files to become the latest copy reflected in the .git directory. The **Committed Edits** version is synced to the remote server as a “peer-to-peer” patch.

Glossary

`git merge` One method to reconcile different committing histories in divergent branches. Creates a new version integrating the head of the two branches in a three-way commit.

`git mv` Moves or renames a specified file, directory, or symlink that is already tracked by Git.

`git fetch` Downloads changes from a remote repository without coalescing with your local copy. Part of the `pull` action.

`git pull` The combined action of `fetch` and `merge` or `rebase`. Downloads changes from a remote repository and coalesces them with your local copy.

Glossary

`git push` Upload your recent **Committed Edits** to a remote repository, synchronizing changes for others to see.

`git rebase` An alternative to `merge`. The branch commit histories are realigned so that the leading one defines the commit parent history of the following branch, thus rebasing its commits.

`git reset` Unstages changes to specified files, moving them from **Staged Edits** back to the **Working Tree** without altering the files' versions in the **Working Tree**.

Glossary

`git status`	Summarizes the state of files in the **Working Tree** and **Staged Edits**, comparing changes to the latest, committed version in the .git directory.
Graphical User Interface (GUI)	An interface that allows users to interact with computers through visual elements like buttons and menus.
Integrated Development Environment (IDE)	A software application that combines tools for editing, building, testing, and debugging code into a single, user-friendly interface.

Glossary

Mirror An exact copy of a project from a server, including al files, the version history, and branches.

Patch Snippets of code or data used to update existing software.

Peer-to-peer Participants in a network act as both client and server by trading resources and services with one another.

Root directory The top-most directory in a branched hierarchy, containing all other files and directories. Your project's root directory holds all the relevant files and code used your project.

Glossary

Server and Client Servers are computers or systems that provides resources (i.e. data or programs) to other computers, known as clients, over a network.

Shell A program used by the CLI to mediate communication between the user and computer by interpreting commands and outputs. Examples: Bash, PowerShell, etc.

Version Control Manage, organize, and track different versions of files. Identify differences between versions and allows reverting to older versions.

Glossary

Helpful Cheat Sheets:

1. Git Cheat Sheet by Atlassian
2. Vim Cheat Sheet by Richard Torruellas
3. Bash Shortcuts by Mohankumar Balasundaram
4. Command Line Cheat Sheet by Tobias Günther

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